



Infor Web UI Sizing and Deployment for a Thin Client Solution

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About this guide

This document provides performance guidelines, best practices, and sizing information for using Infor Web UI 10.x in a thin client environment. Infor Web UI is a web-based interface for all Infor LN versions.

The thin client environments that are covered are the Microsoft Remote Desktop Services and Citrix XenDesktop.

This document is an addition to *Infor Workspace 10.x with Infor Web UI 10.x - Sizing and Deployment Guide (B0032x US)*, which gives performance guidelines and sizing information for the Infor10 Workspace and Infor Web UI server.

A separate sizing document (B0045x US) describes the sizing information for the Infor LN application server.

For the latest information about Infor Web UI, refer to the Infor Web UI 10.x release notes via Infor Xtreme solution 22881482.

Intended audience

This sizing guide is intended for Infor consultants, partners and customers who are responsible for implementing Infor Web UI. This document contains information that can help system administrators to optimize the performance of their Infor Web UI environment in a thin client environment.

Related documents

You can find the documents in the product documentation section of the Infor Xtreme Support portal, as described in "Contacting Infor" on page 8.

Reference	Document name
B0032x US	Infor Workspace 10.x with Infor Web UI 10.x - Sizing and Deployment Guide
U9484x US	Infor Enterprise Server Extensions - Installation Guide

Reference	Document name
U8715x US	Infor Web UI - Installation and Configuration Guide
B0045x US	Sizing Guide for Infor LN
B0072x US	Infor Web UI 10.x - Deployment in a High-available Environment
B0073x US	Deploying Infor LN in a Virtualized environment

Contacting Infor

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If we update this document after the product release, we will post the new version on this Web site. We recommend that you check this Web site periodically for updated documentation.

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Introduction

Thin client solutions, referred to as server-based computing, make it possible to run an application in one location but control it in another location; this concept is referred to as presentation virtualization.

With presentation virtualization, you can install and manage applications on centralized servers in the data center. Screen images are delivered to the user clients, who are referred to as terminals or thin clients. In turn, the user client machines send keystrokes and mouse movements to the server.

When administrators use presentation virtualization, they can present users with the individual applications and data that they require to complete their task, or the whole remote desktop. From a user perspective, these applications look, feel, and behave similar to local applications.

The client for server-based computing can be a terminal, thin client, or a standard desktop PC.



Figure 1-1: Example of a thin client

The advantages of server-based computing are as follows:

- Lower administration costs: no software installation on the client.
- Security: no software or data are installed on the client.
- Lower hardware costs for clients.

The disadvantage of server-based computing is that it requires high system requirements for the Remote Desktop servers.

Layers in a thin client solution

When using a thin client solution, the presentation tier will be served on the Remote Desktop server, instead of the client system. The presentation tier hosts the applications of the thin client.

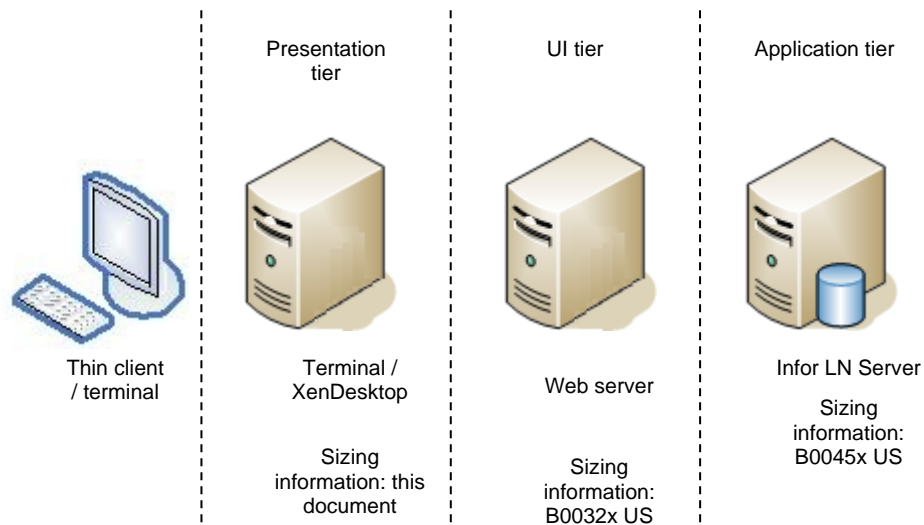


Figure 2-1: Tiers in a thin client configuration

Differences between Microsoft Remote Desktop Server and Citrix XenDesktop

Functionality and performance differences between Citrix XenDesktop and Microsoft Remote Desktop Server are described in this section.

Microsoft Remote Desktop Server

Microsoft Remote Desktop Server uses the RDP protocol to communicate between the terminal client and the Remote Desktop server. This protocol is not optimized for complex graphic user interfaces that are used by Infor Web UI. Microsoft has made protocol improvements in Remote Desktop server 2008, but is not at the same level as Citrix.

The latest Remote Desktop Client 6.1 is backwards compatible with older Windows versions.

Citrix XenDesktop

Citrix renamed Citrix XenDesktop to XenApp. XenApp is the application virtualization platform of Citrix. XenDesktop is the desktop virtualization platform of Citrix.

Citrix XenDesktop can publish the complete desktop or a single application to the thin client or terminal.

Citrix XenDesktop uses the ICA protocol to communicate between the terminal client and the XenDesktop; this is an optimized protocol with a much lower network bandwidth compared to RDP.

Typical deployment scenario

The most common deployment scenario for Microsoft Remote Desktop server or Citrix XenDesktop is to install multiple servers in a farm, and use a load balancing solution (NLB) to distribute users amongst the farm members.

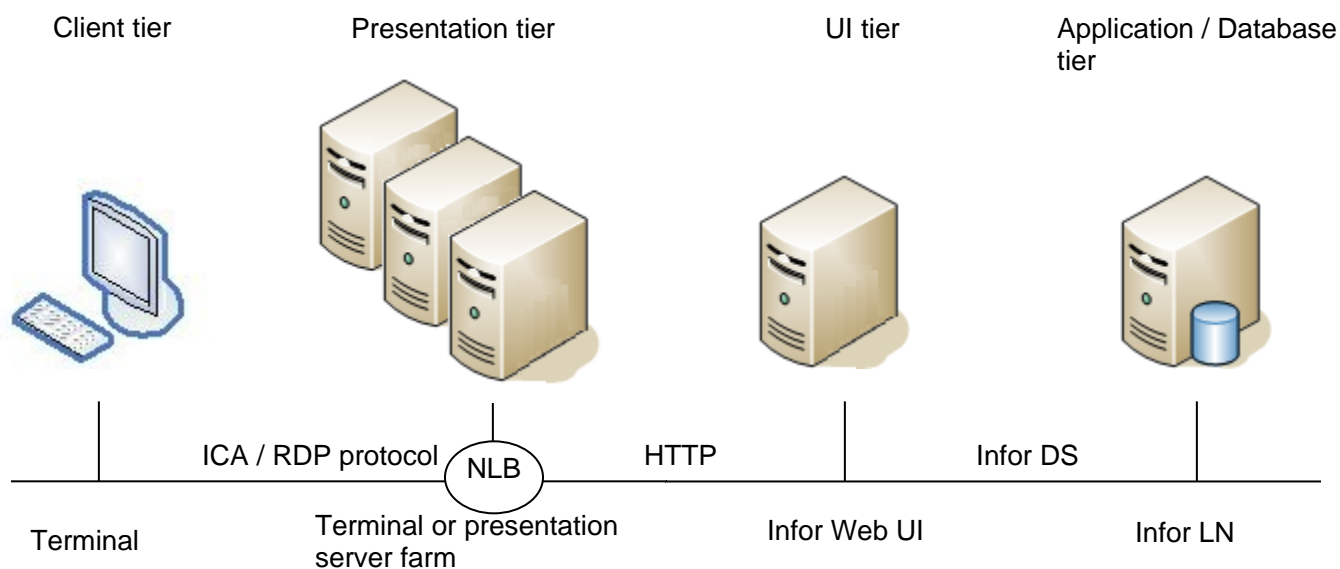


Figure 2-2: Typical deployment scenario of Infor Web UI in a thin client solution

Scope of this document

The thin client solutions covered in this document are:

- Microsoft Remote Desktop Server 2008 x64
- Citrix XenDesktop 5.0

Note the following about the scope of this white paper:

- The information in this document applies to the Remote Desktop server or XenDesktop server that hosts the standalone Infor Web UI client.
- This document covers only the standalone Web UI deployments. Thin client deployments of Infor Web UI within Workspace/SharePoint have not been tested by Infor.
- Newer versions of Citrix XenDesktop, with support for Windows 2008 x64 and Windows 2008 R2 x64, have not been tested by Infor.

Introduction

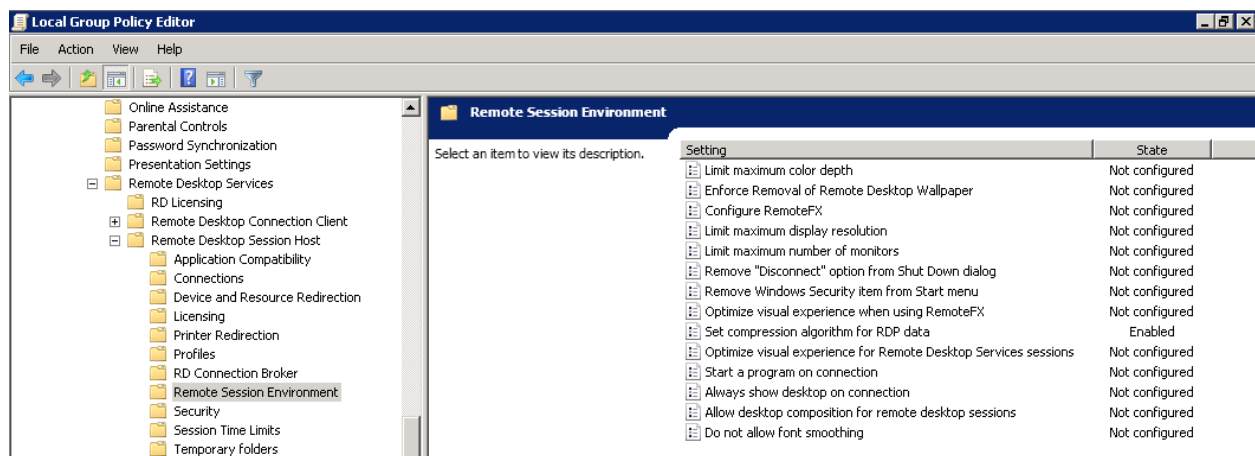
This chapter describes several best practices for the installation and tuning of Infor Web UI 10.x in a thin client solution.

Microsoft Remote Desktop server 2008

Enable network bandwidth compression

The RDP v6.1 protocol in Windows 2008 supports a new compression setting that reduces network bandwidth. Enabling this compressor reduces bandwidth for the Infor Web UI by approximately 60 percent.

To enable this option, Start the group policy editor (gpedit.msc), select Computer Configuration → Administrative Templates → Windows Components → Remote Desktop Services → Remote Desktop Session Host → Remote Session Environment → Set compression algorithm for RDP data.

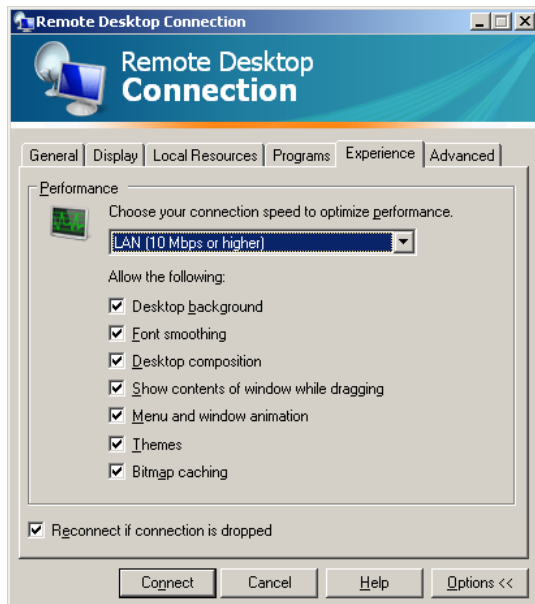


Click Enabled and Change the RDP compression algorithm option to 'Optimized to use less network bandwidth'.

When enabling this setting, you require approximately 8 MB additional Ram per connected user.

Connection speed in Remote Desktop server client

Set the connection speed in the experience tab correctly depending on the network characteristics.



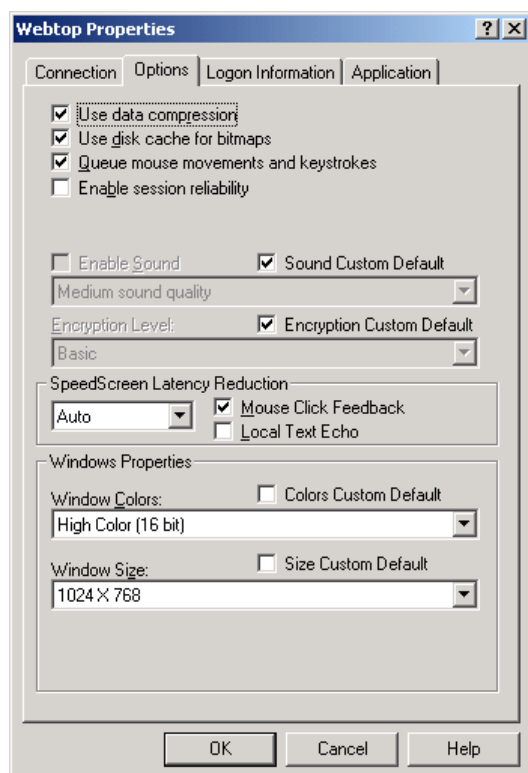
Do not disable the **Bitmap Caching** option.

Turning off individual performance options on the experience tab like Desktop Composition, Desktop Background etc. can improve performance.

Citrix XenDesktop

ICA client options

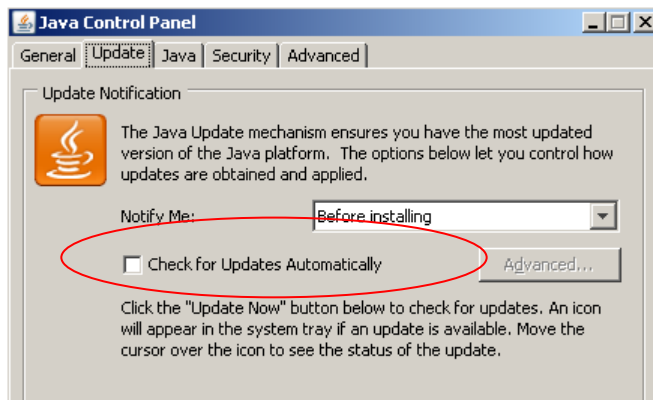
The Citrix client has several options to reduce network bandwidth. In the Citrix ICA client configuration, select the **Use data compression**, **Use disk cache for bitmaps**, and **Queue mouse movements and keystrokes** check boxes, as shown in the following figure:



General settings for all thin client solutions

Disable Java automatic update for each user

By default, the Java plug-in starts a separate process to check for Java updates. This process consumes CPU and memory on the Remote Desktop server. It is recommended that, in the Java Control Panel, you clear the **Check for Updates Automatically** check box for each user.



Use 16-bit color depth

You can select the color depth in the Remote Desktop server client, the Citrix client setup, and the Windows desktop. For the Infor Web UI application and most other applications, a 16-bit color depth is sufficient.

A higher color setting increases a user's network bandwidth usage.

Other settings that improve performance

Consider the following to improve the Infor Web UI performance when using a thin client solution:

- Use a lower resolution of the desktop.
- Disable redirection of devices that are not required (e.g. disks, USB etc).
- Enable bitmap caching in the remote access client.
- Ensure that hardware acceleration is enabled for your graphics driver.

Peak load

Resource conflicts on the Remote Desktop server will immediately result in slow response experiences for users. Avoid loading the Remote Desktop server to the maximum capacity by reserving capacity for peak load.

The user logon process results in significant CPU peaks on the server. This is caused by starting the Windows desktop, the browser, and the Infor Web UI application.

To avoid performance problems due to peak load and user logon processing, you must apply the following recommendations:

- The average CPU load of the Remote Desktop server should not exceed 50% - 60% of the total CPU capacity.
- Free or available memory on the Remote Desktop server should not fall below 1 GB.

Roaming profiles

Roaming profiles are user profiles that are copied to the server when the user logs on. Roaming profiles are often used in a multiple server setup, that is, a server farm.

Large user profiles increase network usage and can cause delays when users log on. The document and settings directory is part of the user profile.

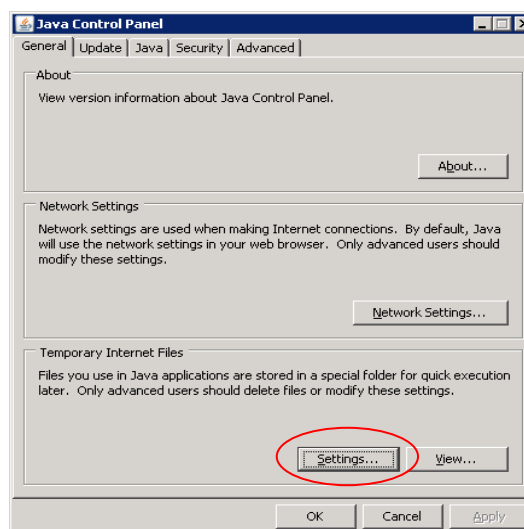
Avoid the creation of large user profiles by storing only required data in the profile. Other data, such as browser caches and temporary files, must be stored in a different user-based location.

Java cache settings

By default, Java uses caching, which is stored in the local user directory (C:\Documents and Settings\\Application Data\Sun\Java\Deployment\cache).

If you use a setup with multiple Remote Desktop servers and roaming profiles, you should not store the Java cache in the document and settings directory.

The directory for caching can be changed in the Java Control Panel, and must point to a user-based directory on the Remote Desktop server.



Graphics and themes

Network bandwidth usage increases in case the user interface contains more graphical elements. Examples of increased graphical elements are as follows:

- Large company logos in the Web UI
- Background images in the Web UI
- Choosing a high graphical or colored theme in the Web UI results in higher network load

Sizing Infor Web UI in an existing Remote Desktop server setup

The sizing figures in this document are for Infor Web UI only. Generally, customers run other applications on the Remote Desktop server as well.

To include Infor Web UI usage in an existing Remote Desktop server, complete the following steps:

- 1 Measure the current CPU and memory usage on the existing Remote Desktop server or XenDesktop for a couple of days. Take the highest average CPU load and the maximum memory usage from these measurements.
- 2 Size the requirements for the Infor Web UI users on CPU and memory. For existing users, use the memory requirements 'excluding terminal processes', because they are already included in step 1.
- 3 Determine if the existing Remote Desktop server or XenDesktop has sufficient capacity.

Measuring CPU and memory usage on a Microsoft Windows server

First you must determine the current CPU and memory usage of the existing Remote Desktop server. To measure the average CPU usage and available memory over a couple of days, use the Microsoft PerfMon tool which is included in Windows.

Use the "% Processor Time(_Total)" and "Available Mbytes" PerfMon counters to monitor the CPU and memory usage. Take the highest average CPU usage and the maximum memory usage from the measurements.

Introduction

The sizing information in this chapter applies only to running Infor Web UI 10.x on the Remote Desktop server or XenDesktop. For additional sizing information for Infor Web UI see *Infor10 Workspace 10.x with Infor Web UI 10.x Sizing and Deployment Guide (B0032x US)*.

There are three important aspects when sizing Infor Web UI in a thin client solution:

- CPU requirements
- Memory requirements
- Network requirements

The sizing information in this chapter is for Infor Web UI only. Requirements for other applications that run on the Remote Desktop server or XenDesktop, for example, office applications, must be added to the sizing requirements of Infor Web UI.

CPU requirements

Infor Web UI is a CPU and memory intensive application that is designed to run on a desktop. In the benchmark scenario, the following numbers of concurrent users were run:

Processor	Concurrent Web UI users	Avg CPU usage per Web UI user
1 * Intel Quad Core X5450 3.0 GHz	70	0.9%
2 * Intel Quad Core X5450 3.0 GHz	120	0.5%

Table 3-1 CPU requirements

Do not exceed an average CPU utilization of 50% - 60% on the Remote Desktop server or XenDesktop, because the CPU load of the Web UI has many fluctuations. The Windows logon process, starting of the desktop, the explorer, and the starting of the Web UI require significant CPU capacity that results in CPU peaks.

If you keep the average CPU utilization of the server below 60%, there is sufficient spare capacity to handle the CPU peaks. The 60% CPU margin is included in the 'Average CPU usage per Web UI user' column in the previous table.

Memory requirements

To calculate memory usage for a new Remote Desktop server, use the following formula:

Memory = Operating system base memory 1GB + (number of concurrent users * memory per user).

To calculate additional memory usage for an existing Remote Desktop server, use the following formula:

Additional memory = (number of concurrent users * memory per user).

The table below shows the memory usage of Infor Web UI, including and excluding the Remote Desktop server processes. The memory usage is based on the working set size.

For sizing of existing Remote Desktop server users who use Infor Web UI as an additional application, use the 'excluding terminal processes' figures.

For sizing of new Remote Desktop server users, use the 'including terminal processes' figures.

	New Users (Incl terminal processes)	Existing Users (Excl terminal processes)
Remote Desktop Server	250 MB	160 MB
Citrix XenDesktop	200 MB	140 MB

Table 3-2 Memory requirements

Example 1: 20 Infor Web UI browser users on a Remote Desktop Server 2008 solution require a total memory of 1 GB + (20 * **250 MB**) = 6 GB.

Example 2: 20 existing users using Infor Web UI browser as an additional application on a Remote Desktop Server 2008 solution require an additional memory of (20 * **160 MB**) = 3,2 GB.

Network requirements

There is a difference in network requirements between the tested thin client solutions. The three aspects of network usage are as follows:

- Bandwidth requirement: This is the speed of the link, which is specified in kilobits per second (kbps) or megabits per second (Mbps).
- Latency: This is the delay in sending packages over the network, which is specified in milliseconds (ms).

- **Quality of the link:** This is determined by package loss, errors, and retransmits.

The network requirements here are based on a configuration that includes all the recommendations that are listed in the “Best Practices for Infor Web UI in a Thin Client Solution” chapter.

Network requirements between the Remote Desktop server and the Web UI server

The minimum network requirement between a Remote Desktop server or XenDesktop and the Web UI server is 100 Mbps; 1 Gbps is recommended. The network must be a LAN with latency of less than 1 ms.

Network requirements between the thin client and the Remote Desktop server

This section shows the network requirements between the thin client and the Remote Desktop server.

Local Area Network (LAN) requirements

The minimum network connection between a client terminal or desktop and the Remote Desktop server or XenDesktop is 10 Mbps.

Wide Area Network (WAN) requirements

You can run the thin client over a WAN connection which complies with the bandwidth, line quality, and latency requirements in this chapter.

Table 3-3 shows the network requirements of the different thin client solutions. For comparison reasons, the last line shows the average bandwidth usage of the tested use case on a desktop, without using a thin client.

(Thin) Client Solution	Network Requirement (kbps) per user	Minimum bandwidth	Maximum latency
RDS 2008 (including bandwidth compressor)	50	512 Kbps	200 ms
Citrix XenDesktop	15	128 Kbps	200 ms
Physical Desktop	12	10 Mbps	1 ms

Table 3-3 Network requirements

Bandwidth requirements

To calculate the required bandwidths, use the following formula:

Required bandwidth = Minimum bandwidth + (number of concurrent users * bandwidth per user).

Example: 20 Infor Web UI users on a Remote Desktop Server 2008 solution require a bandwidth of 512 kbps + (20 * 50 kbps) = 1512 kbps.

Line quality

The line must have a guaranteed bandwidth and 0%package loss.

VPN connection

You can run the thin client over a VPN connection on the internet. The performance depends on the connection speed of the provider and the speed of internet at that moment, because an internet connection does not have a guaranteed bandwidth or latency.

Network usage

Generally, network lines are used for other traffic such as other applications, IP phone traffic, and video conferencing.

The Infor Web UI network bandwidth requirements must be added to the existing bandwidth usage of the network.

Introduction

This sizing example is intended to help you understand the sizing model of Infor Web UI in a thin client solution.

The company

A company wants to implement Infor Web UI in an existing Remote Desktop server 2008 solution, and plans to enable Infor Web UI usage for 25 users. The company uses Internet Explorer.

All users work in the same location and use a LAN.

The sizing must determine if the existing hardware configuration of the Remote Desktop server is sufficient.

Thin Client Solution	CPU	Memory	Network
Existing RDS 2008	1 Quad Core CPU 3.0 GHz	4 GB internal memory	1 Gbps network

Table 4-1 Existing Server configuration

Sizing

To size an existing Remote Desktop server, complete the following steps:

- 1 Measure the current CPU and memory usage on the existing Remote Desktop server or XenDesktop for a couple of days. Take the highest average CPU load and the maximum memory usage from these measurements.
- 2 Size the requirements for the Infor Web UI users on CPU and memory. For existing users, use the memory requirements 'excluding terminal processes', because they are already included in 1).
- 3 Determine if the existing Remote Desktop server or XenDesktop has sufficient capacity.

Determine current load on the existing Remote Desktop server

First you must determine the current CPU usage and memory usage of the existing Remote Desktop server. To measure the average CPU usage and available memory over a couple of days, use the Microsoft Perfmon tool which is included in Windows.

Take the highest average CPU usage and the maximum memory usage from the measurements.

CPU type	CPU usage	Available memory
1 Quad Core CPU 3.0 GHz	Average 15%	1.5 GB

Table 4-2 Current load Remote Desktop server

Determine requirements for Infor Web UI users

Determine the CPU and memory requirements for the Infor Web UI users.

The company enables access to Infor LN usage for existing Remote Desktop server users. Therefore, use the 'excluding terminal processes' figures from the "Sizing Information" chapter for the memory calculation. An Infor Web UI user without Remote Desktop server processes consumes 160 MB of memory on Microsoft Remote Desktop server 2008.

Additional memory: 25 users * **160 MB** = 3.9 GB of memory required.

For the CPU calculation, use the figures in the "Sizing Information" chapter. A Quad Core 3.0 GHz CPU supports up to 70 concurrent users. The average CPU load should not exceed 60 percent.

CPU: 25 users * 0.9% = 23% CPU required.

Determine if the existing Remote Desktop server has sufficient capacity

Determine if the Remote Desktop server has sufficient capacity for the 25 Infor Web UI users.

	Existing Usage	Required (25 users)	Total Requirement
CPU	15%	23%	38%
Memory	2.5 GB	3.9 GB	6.4 GB

Table 3-3 Network requirements

The total requirement for CPU (38 percent average load) is within the recommended maximum of 60 percent average CPU load.

The total requirement of 6.4 GB exceeds the currently installed 4 GB of memory.

The conclusion is that this customer must expand the memory of the existing Remote Desktop server to 8 GB.

Network requirements

All users of the company are in one location and connected to the Remote Desktop server or XenDesktop using a LAN.

The minimum network requirement between the Remote Desktop server or XenDesktop and the application server is 100 Mbps; 1 Gbps is recommended.

The minimum network connection between a client terminal or desktop and the Remote Desktop server or XenDesktop is 10 Mbps.