

TotalChrom/Citrix MetaFrame XP Installation

Introduction

This document provides an overview of Citrix MetaFrame XP 1.0 Server, and reviews installation and configuration issues impacting use of the product with TotalChrom (TC) 6.2.0 and Turbochrom 6.1.X.

What is Citrix?

Citrix MetaFrame XP is a server-based computing package that incorporates a proprietary network protocol that separates an application's logic from its user interface allowing clients to run "thin." Thin clients have little or no secondary storage and are used only as clients depending on the server for software, processing and secondary storage.

The proprietary network protocol that allows users to use Citrix technology is the Independent Computing Architecture (ICA). ICA is the basis of Citrix server-based computing with MetaFrame XP and ICA Client software. The ICA protocol transports an application's screens from a MetaFrame XP server to ICA Client users and returns the users' input to the application on the server. All application logic is run on a server, while the only events traversing the network are keystrokes, mouse clicks and screen updates. Citrix is a centralized applications server that offers easy access to fully featured applications.

You can think of Citrix as a virtual workspace where you can use programs that are not installed on

your personal computer.

Applications run from Citrix will work exactly like applications installed locally. Accordingly, programs available to users on Citrix are fully functional and offer the same interface and features as their local counterparts.

Why use Citrix

Diverse computing environments are commonplace in today's business enterprise. A computing infrastructure is typically made up of assorted client devices such as PCs, terminals and laptops. They typically employ various operating systems, protocols and network connections. However, applications must be available to users regardless of the diversity of an organization's computing infrastructure. Deployment of applications to users is essential to business regardless of network and desktop configurations.

Citrix allows companies to keep their current desktops regardless of type and use the same network hardware and protocols resulting in lower total cost of ownership (TCO) and a greater return on investment (ROI).



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Some significant advantages for TC users using Citrix include:

- The ability to manage enterprise applications from a single point.
- The ability to offer higher levels of security.
- The ability to provide application/system upgrades without having to visit every desktop the application is installed on.

Application or system upgrades would be performed on the Citrix server hosting the TotalChrom client as well as any TotalChrom server functioning as a License Manager, Acquisition server or Analysis server.

With Citrix MetaFrame XP 1.0, applications such as TotalChrom that distribute processing and execution between a server and a client can now transfer all processing and execution to the server only. From a validation standpoint this is appealing because it centralizes system management and improves lab 21 CFR Part 11 compliance. This single point manageability feature is one that many enterprises find advantageous in deployment of mission-critical applications.

System Hardware and Software Requirements

MetaFrame XP System Software

Requirements: Windows 2000 server Family: Windows 2000 Server, Windows 2000 Advanced Server and Windows 2000 Datacenter Server. Citrix recommends that you install the latest Microsoft service pack for the OS.

Important: You must install the Terminal Services component before you install MetaFrame XP. Terminal Services is not installed in Windows 2000 by default. You can install by using the Add/Remove Windows component in the Add/Remove Programs in the control panel. Terminal Services *must* be installed in the Application Server mode.

MetaFrame XP System Hardware

Requirements: The following requirements are for the operating systems on which MetaFrame XP is installed.

- **Windows NT Server 4.0, Terminal Server Edition:** Microsoft recommends a Pentium or better microprocessor, 32MB of RAM, and a hard disk with at least 128MB of free space.

Important: Feature Release 2 for MetaFrame XP does not operate on Windows NT Server 4.0, Terminal Server Edition.

- **Windows 2000 Server and Advanced Server:** Microsoft recommends a 166-MHz or faster Pentium-compatible processor, 256MB of RAM, and a 2GB hard disk with at least 1GB of free space.
- **Windows 2000 Datacenter Server:** Microsoft recommends eight-way or greater array of Pentium III Xeon processors, 256MB of RAM, and a 2GB hard disk with at least 1GB of free space.

Sizing Your System

Determining system specifications requires examining minimum hardware requirements and calculating the projected server load based on the number of users and instruments. Other items to consider are the physical network and the usage scenario.

When sizing a system, it is important to remember that no system is like any other and no one knows for sure what the size of your system should be. The performance of a system varies upon the configuration of specific components. Important considerations include:

- **Applications:** The complexity of the application that will be published on the Citrix server

- **User Profiles:** Which users need what applications?
- **Usage Scenarios:** How do users access applications? Through a local area network or a wide area network? When do they access it? At peak network usage times? From where? Are users connecting remotely from home offices or again, from a LAN on the company backbone?
- **Physical Network:** How is the network subdivided? Is it divided into multiple subnets or segments? Is there a server on each subnet or do the clients have to cross routers to get the server? You can distribute server requests by implementing such a design or alternatively attaching your one server to each subnet with a separate adapter for each. This reduces congestion at the server by spreading server requests.
- **Server Hardware and Configuration:** This is where the minimum hardware and software configuration come into account. Many times users are tempted to calculate the potential size in which a server will be by considering this facet only. Although this is important when sizing a system, it is not the only metric to measure.

To ensure optimum performance in the future, make certain to answer these questions and incorporate them into a development system prior to installing in a production environment.

The Pilot System

When sizing requirements are satisfied, the test system should use actual components of the finished design:

- Actual users
- Actual applications
- Actual server hardware
- Actual network and backend resources

Identifying Performance Bottlenecks in Windows 2000

When the demand for resources (such as microprocessors, memory, hard disks, and networking hardware and software) exceeds supply, system throughput problems usually occur. Isolating performance problems begins with determining how users, applications, and the operating system interact with each resource.

Performance Monitor is a Windows 2000 tool that incorporates a collection of counters that examines data, such as the number of processes waiting for disk time, the number of Memory Pages/sec, and the percentage of processor utilization. With this data, a company can establish a baseline performance for a system and tune the system accordingly when the need presents itself. Data can be displayed as it is collected, stored in logs for later use and comparison, or both.

Examples of performance bottlenecks in Windows 2000/NT that can effect the performance of applications include:

1. Processor counters

- a. Processor Queue – An instantaneous count of threads that are in the processor queue. A thread is a sequence of program code scheduled for execution on the processor.
- b. Percentage of total processor time

2. Memory Counters

- c. Available bytes
- d. Pages/second

By using these and other performance monitoring Tools, administrators can use the information to get accurate accounts of system performance.

Memory Needs

The memory requirement for MetaFrame XP is 16MB plus 4MB for each typical user and 8MB for each power user.

Typical User – Uses one or more applications but generally uses one at a time. When sizing a system, the typical user should be allocated 4 MB memory (RAM) per user.

Power User – A more advanced user who use three or more applications simultaneously with several active at one time. An average power user should be allocated 8 MB memory (RAM) per user.

Processor and Bus

You should use EISA or PCI. Do not use ISA (AT). ISA is low-bandwidth architecture and not recommended for high-performance processing. EISA or PCI support a high data transfer rate that is typical of MetaFrame XP servers.

Note: Win16 Application Requirements: consumes additional resources and lowers number of users per processor by 20%.

Hard Disks

Since system throughput is an important factor for a server, Citrix recommends using a SCSI-2, Fast Wide SCSI, and Wide-Ultra2 SCSI or SCSI-2 devices for MetaFrame servers. These devices have better throughput than IDE< ST-506 or ESDI disk drives.

NIC

A high performance network card is suggested on the server. In conclusion when sizing a system, the key concept to focus on when deploying TotalChrom and Citrix is *every environment is different*. The parameters discussed are all important factors when sizing a system, but the ultimate test is the *end-user's application response time*.

Overview of Windows 2000 Terminal Services

Terminal Services must be configured to run Citrix MetaFrame XP 1.0. Terminal Services licenses Windows clients that log on to a Terminal server(s) that host applications for the Windows clients.

1. Terminal Services licensing

includes the following components:

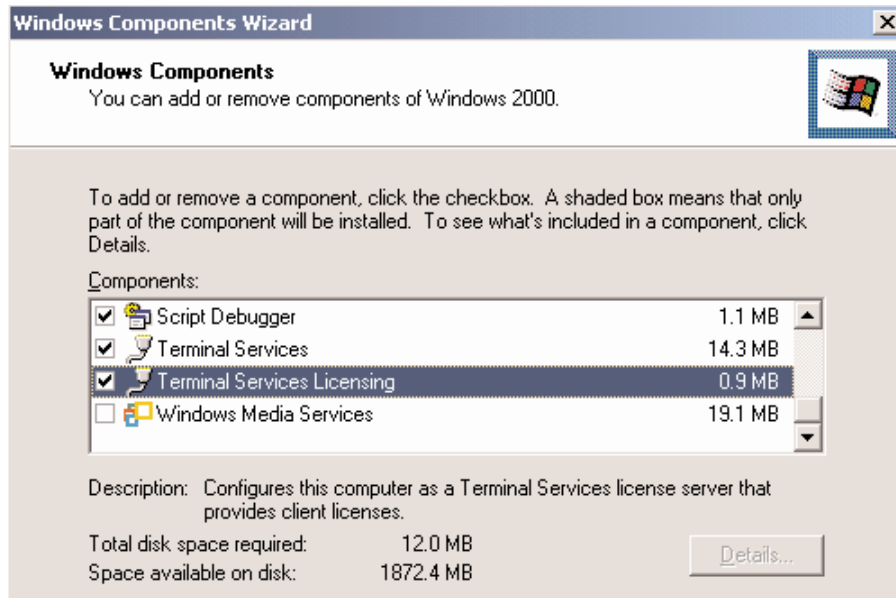
- a. The Microsoft Clearinghouse
 - b. A license server
 - c. A Terminal server
 - d. Client licenses
- The Microsoft Clearinghouse is the database Microsoft maintains to activate license servers and to issue client license key packs to the license servers that request them. The Clearinghouse stores information about all activated license servers and client license key packs that have been issued. Access the Clearinghouse through the Licensing wizard with the Terminal Services Licensing feature.

2. A license server stores all Terminal Services client licenses that have been installed for a Terminal server and tracks the licenses that have been issued to client computers or terminals. *In Windows 2000 domains, the license server must be installed on a domain controller*. It is recommended that you *enable Terminal Services on a member server or stand-alone server*, and that you *install the license server on a different computer*.

3. A Terminal server is the computer on which Terminal Services is enabled. When clients log on to the Terminal

server, the server validates the client license. If a client does not have a license, the Terminal server requests one for the client from the license server. For purposes of TotalChrom, the server must be installed in Application Mode.

4. Client Licenses: Each client computer or terminal that connects to a Terminal server must have a valid client license. The client license is stored locally and presented to the Terminal server each time the client connects to the server. The server validates the license, and then allows the client to connect.



Required Licenses

Deploying Terminal Services and Terminal Services Clients on your network requires the following licenses:

- 1. Windows 2000 Server License:** This license is included with the purchase of the product.
- 2. Windows 2000 Server Client Access License:** This is required for each device connecting to Windows 2000 Server. Client Access Licenses permit clients to use the file, print, and other network services provided by Windows 2000 Server. The Terminal Services component of Windows 2000 Server requires Per Seat licensing for the Windows 2000 Server Client Access License, except when you purchase the Windows 2000 Terminal Services Internet Connector License.

Each client computer or terminal requires the following licenses:

3. Windows 2000 Terminal Services Client Access License or Windows 2000 License: The Client Access License provides each client computer or Windows-based terminal the legal right to access Terminal Services on a Windows 2000 Server. For example, this license is required to start a terminal session and run Windows-based applications on the server. The Windows 2000 license permits the installation of the Windows 2000 operating system, in addition to providing the legal right to access Terminal Services on a Windows 2000 Server. The Terminal Server Client Access License is not required for clients connecting only to Terminal servers in Remote Administration mode.

Summary:

Terminal Services must be configured to run Citrix MetaFrame XP 1.0

- 1. Windows 2000 Server License:** Standard W2K license

2. Windows 2000 Server Client Access License: Terminal service license (on license server and distributes client licenses)

- 3. Windows 2000 Terminal Services Client Access License or Windows 2000 License** (client license)

For more information go to the Microsoft Support website and search for: **HOW TO: Activate a License Server by Using Terminal Services Licensing in Windows 2000.** <http://support.microsoft.com>

Example Configuration: Before deciding on the configuration to use, read the Sizing Systems section that helps outline the configuration that best suits your organization's needs. This is not a suggestion of how TotalChrom should be installed with Citrix, but a configuration that has been implemented and tested within a test environment.



TotalChrom Server
Server 1
Windows 2000 Server
Functions as a
License Manager, Acquisition
and Analysis server



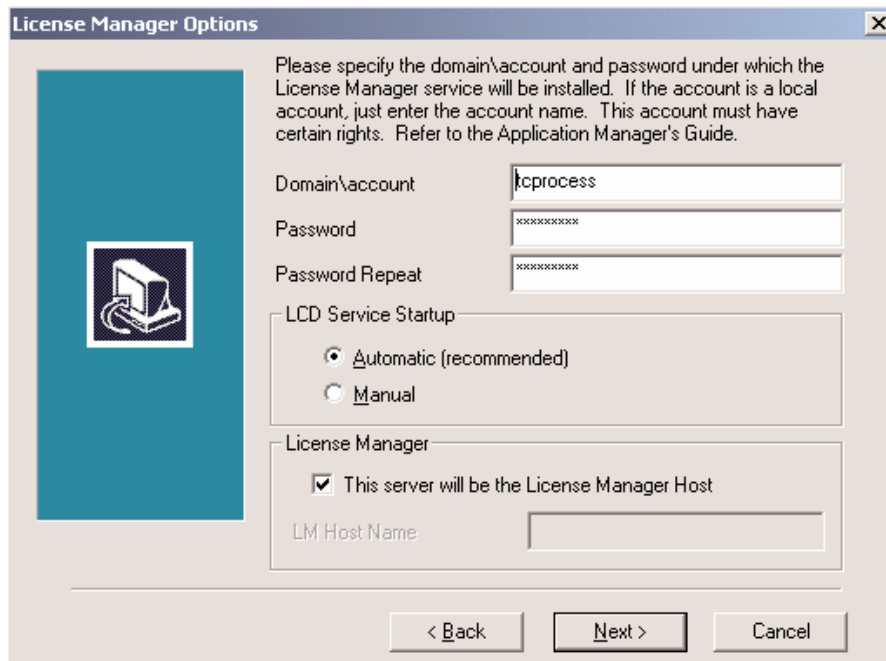
Citrix MetaFrame XPe FR2
Server 2
Windows 2000 Server
TotalChrom 6.2 client installed
TotalChrom 6.2 Client Published App
Client Application Server



DC/DNS Server
Server 3
Windows 2000 Server
Windows 2000 Server License
(standard W2K license)
Windows 2000 Server Client Access License
(Terminal service license on license server
and distributes client licenses)



Citrix Client
Client 1
Citrix ICA Client Installed
TotalChrom 6.2 Client
accessible through Citrix
Program Neighborhood



How to Install TotalChrom in a Citrix MetaFrame XP Environment

1. **Install one of the Windows 2000 operating systems** on *Server 1*, the TotalChrom Server and *Server 2*, the Citrix Server that will host the TotalChrom Client.
2. **Install Citrix MetaFrame XP** on *Server 2*- The Windows 2000 Server that will host the TotalChrom 6.2 client.
3. **Install TotalChrom C/S** as outlined in Chapter 2 of the Application Manager's Guide, on the server(s) that will act as the License Manager, Acquisition and Analysis server(s), in this scenario, Server 1. *It is possible for all 3 to be on one server or on 3 separate servers.*
4. **Install TotalChrom C/S** as outlined in Chapter 2 of the Application Manager's Guide, on Server 2, the Citrix MetaFrame XP server. The only difference between a client install and a server install is when specifying the License Manager Host option on the License Manager Option screen.
 - If you are installing the software on a computer that will be the License Manager Host, select the "License Manager Host" check box, and leave the "LM Host Name" line blank.
 - If you are installing the software

on a computer that will not be the License Manager Host (Acquisition or Analysis server, client computer), do not select the "License Manager Host" check box. Enter the server name of the License Manager Host of your Windows NT or Windows 2000 server in the "LM Host Name" line.

5. Install TotalChrom Software Releases.

Software Maintenance Releases (SMRs) are fixes to program bugs. The installation of patches on clients and servers depends on how an organization uses the software and which version of Turbochrom/TotalChrom is implemented at a particular site. On the Web, set your browser to <http://instruments.perkinelmer.com/support/software-chdmaint.asp> to review and download the SMR appropriate for your needs. Each SMR will have a title, a description of the problem, and the fix.

6. Install Citrix MetaFrame XP 1.0.

Before installing Citrix on the server that will host the TotalChrom client, be sure to have read the hardware and software requirements as well as the section regarding sizing systems. The general rule of thumb is to allocate 4MB of RAM for every typical user and 8MB of RAM for every power user. Citrix scales linearly in that if the amount of

memory and processor speed doubles, the server supports double the amount of users.

During the installation of Citrix, administrators have the option to configure several features:

- *MetaFrame Interoperability* – By default, MetaFrame XP server farms operate independently from the legacy version of MetaFrame, version 1.8. However, MetaFrame XP servers can operate in mixed-mode with MetaFrame 1.8 servers. This allows the pooling of licenses and load-balancing of applications between the XP and 1.8 servers in a server farm. A server farm is a group of Citrix servers managed as a single entity.
- *Farm Administrator* – This section of the installation is where you specify an NT user that will be the administrator of the server farm.

- *Network ICA Connections* – An ICA connection can be used on most types of networks. The ICA protocol transports an application’s screens from a MetaFrame XP server to ICA Client users and returns the users’ input to the application on the server. Clients can access applications via the Internet using TCP/IP. They can also connect to MetaFrame over local networks with IPX, SPX or Net BIOS. TotalChrom only operates on TCP/IP networks.
- *TAPI (Telephony Application Programming Interface) Modem Setup* is an API (Application Programming Interface), which connects PCs running Windows to telephone service lines. To give remote users dial-up access to the Citrix server with ICA Clients, you can add modems here. If you do not want to add any TAPI modems during installation, you can do so later in the Phone and Modem option under the Windows Control Panel.
- *ICA Session Shadowing* – Session shadowing allows administrators to monitor and interact with users’ ICA sessions. When you shadow an ICA session, you can view everything that appears on the users’ session display. You can also use remote control features to control the mouse and enter key strokes from a remote location.
- *Drive Mapping* – Client drive mapping allows clients to use their hard drives during ICA sessions. The client drive appears as a network type (Client Network) in Network Neighborhood while the Citrix server’s local drives appear local to the client in Windows Explorer. The client’s disk drives are displayed as shared folders with mapped drive letters. Windows Explorer can use the client’s disks like any other network drive.

Default server drive letter settings during installation

Client Drive	A:	Is accessed in ICA sessions as:	A:
	B:		B:
	C:		V:
	D:		U:
Server Drive	C:	Is accessed in ICA session as:	
	D:		D:
	E:		E:

Citrix grants the option to reassign the server drive letters as well as the client drive letters.

Warning! After the server letters are changed, they will maintain the drive letter configuration even upon uninstalling MetaFrame XP from the system.

- *Citrix XML Service* – MetaFrame XP uses Citrix XML Service to supply NFuse Web Servers and TCP/IP-connected clients with the names of published applications like TotalChrom on the Citrix server or in a server farm. The Citrix XML Service is a Windows NT service that provides an HTTP interface to the ICA Browser. It uses TCP packets, which allows connections to work across most firewalls. The default port for the Citrix XML Service is 80. With Citrix NFuse, users can connect to published applications through a web browser. NFuse runs on a Web server and connects with MetaFrame XP servers through the Citrix XML service. All servers must be configured with the same TCP/IP port.
- *ICA Client Distribution Wizard* – Citrix can run on many different types of client operating systems. This is one of the most appealing features of Citrix. The first place where IT managers and others try to save money is the PC, breaking the long-held rule that PCs must be upgraded every three years. By incorporating Citrix into an organization’s infrastructure, applications are accessible from

stripped-down PCs, extending their lifespan.

The ICA Client Distribution Wizard will populate a network share with ICA Client images making for easy deployment of ICA Client software. ICA clients are available for Windows, Macintosh, UNIX, Linux, Windows CE, DOS and Java operating systems as well as Web browsers that use the ActiveX control or Netscape plug-in.

- *MetaFrame XP 1.0 Licensing* – To enter licenses for Citrix products, get the product code and license serial number from your MetaFrame product packaging. Have the product codes and license serial numbers readily available. They do not have to be entered during installation. They can be installed later through the Citrix Management Console.

Note: The MetaFrame XP server will not accept ICA connections until a product code is specified.

After installation, *Restart the System.*

7. Set Permissions

Set permissions on the TotalChrom server and client according to specifications outlined below. This matrix is also referenced in the TotalChrom Application Manager’s Guide Chapter 2, page 2-2.

Directory Name	TotalChrom Process Account	TotalChrom Manager Account	User(s) Account	OS System Account	OS Admin Accounts
\ (Root Directory)	Read/ Execute	Read/ Execute	Read/ Execute	Read/ Execute	Read/ Execute
\PenExe	Read/Execute	Read/ Execute	Read/ Execute	Full	
\PenExe\TcCS	Read/ Execute	Advanced	Read/ Execute	Read/ Execute	Full
\PenExe\TcCS\Stats	Modify	Read/ Execute	Read/ Execute	Read/ Execute	Full
\PenExe\TcCS\Ver6.x.x	Read/ Execute	Read/ Execute	Read/ Execute	Read/ Execute	Full
\PenExe\TcCS\Ver6.x.x\Bin	Read/ Execute	Read/ Execute	Read/ Execute	Read/ Execute	Full
\PenExe\TcCS\Ver6.x.x\Config	Read/ Execute	Read/ Execute	Read/ Execute	Read/ Execute	Full
\PenExe\TcCS\Ver6.x.x\Config\User	Modify	Modify	Modify	Read/ Execute	Full
\PenExe\TcCS\Ver6.x.x\Config\Sys	Modify	Modify	Read/ Execute	Read/ Execute	Full
\PenExe\TcCS\Ver6.x.x\Examples	Modify	Modify	Read/ Execute	Full	
\PenExe\TcCS\Ver6.x.x\Help	Read/ Execute	Read/ Execute	Read/ Execute	Read/ Execute	Full
\PenExe\TcCS\Ver6.x.x\Log	Modify	Modify	Advanced	Modify	Full
\PenExe\TcCS\Ver6.x.x\Rpt	Modify	Modify	Advanced	Read/ Execute	Full
\PenExe\TcCS\Ver6.x.x\Temp	Modify	Modify	Modify	Read/ Execute	Full
RAW data file storage directories	Modify	Read ¹ / Execute	Read/ Execute	Read/ Execute	Full
ADDITIONAL TotalChrom file directories					

1 May be set to Modify if you desire that the system manager purges files after archive.

(*) If the user will be converting Access*Chrom files they will require RWX rights to the directory containing the .ACR files.

The following permissions should be granted to the CitrixGroup and CitrixAdmin Account that require access to TotalChrom application and data files.

Directory Name	CitrixAdmin	CitrixGroup
(Root Directory)	Full Control	Full Control
\PenExe	Full Control	Read/Execute
\PenExe\TcCS	Full Control	Read/Execute
\PenExe\TcCS\Stats	Full Control	Read/Execute
\PenExe\TcCS\Ver6.X.X	Full Control	Read/Execute
\PenExe\TcCS\Ver6.X.X Bin	Full Control	Read/Execute
\PenExe\TcCS\Ver6. X.X \Config	Full Control	Read/Execute
\PenExe\TcCS\Ver6.X.X \Config\User	Full Control	Modify
\PenExe\TcCS\Ver6.X.X \Config\Sys	Full Control	Read/Execute
\PenExe\TcCS\Ver6. X.X \Examples	Full Control	Read/Execute
\PenExe\TcCS\Ver6..X.X \Help	Full Control	Read/Execute
\PenExe\TcCS\Ver6.X.X \Log	Full Control	Advanced
\PenExe\TcCS\Ver6.X.X \Rpt	Full Control	Advanced
\PenExe\TcCS\Ver6.X.X \Temp	Full Control	Modify

8. Install ICA Client

Given the proper permissions and rights, Citrix ICA Client software allows users to connect to Citrix servers and access the applications installed on them. ICA Clients are available for Windows, Macintosh, UNIX, Linux, EPOC, Windows CE, DOS, and Java operating systems.

The final step in configuring your system is to grant access to the TotalChrom client application running on the Citrix server. You do this by installing an ICA Citrix client on the PC acting as a dumb terminal. There are several ways in which you can deploy the ICA Client to a terminal. You can deploy clients through the Web, through a network sharepoint and with installation diskettes.

Web-Based Installation

The Web-based install involves creating an

installation Web page on your corporate intranet with links on it that point to the ICA Client setup files. The ICA Clients packaged for Web-based installation can be distributed to a network share by running the ICA Client Distribution wizard from the Citrix server or by copying them from the NFuse Elite CD that comes with your Citrix Installation Set. You can also obtain the documentation and components for the Web installation from the download section on the Citrix Web site at <http://www.citrix.com/download>

Network Installation

To deploy ICA Clients from a network share point, run the ICA Client Distribution Wizard from the MetaFrame toolbar on the Citrix server to copy ICA Client files on the ICA Client CD to your MetaFrame XP server. Copy the ICA Client files from your Citrix server to

a network share point. Each client will have its own folder on the Citrix server i.e. the ICA Win 32 client will have a folder \ICA32 to copy the files from. Provide users with the path to the Setup.exe file in the appropriate ICAClient share point. To install the ICA Client software on a client, instruct the users to double-click the Setup.exe file.

Installing Clients by Using Diskettes

Use the ICA Client Creator on the Citrix server's MetaFrame Toolbar to create client installation disks. With the Client Creator administrators can create client diskettes for DOS, Windows 95/98/ME/NT and the ICA Client for Windows 3.x. Installation files for other clients can be found in the folder%SystemRoot%\System32\Clients\ICA. Simply copy the files for the corresponding client to a diskette to create the install disk(s).

Summary

The Pharmaceutical and related healthcare industries are under pressure to reduce costs while at the same time increase their product-to-market life cycle. To increase efficiency, the implementation of TotalChrom C/S in a Citrix MetaFrame XP environment maximizes your investment in the system, minimizing validation costs. TotalChrom C/S is installed on a server which will function as the application server, while you may only need to install the client portion on one server - the Citrix server. The client portion is "published" through the Citrix Management Console which gives clients access to TotalChrom. Clients have several options to access the Citrix client software. Once installed, the client can use TotalChrom through Citrix technology as if it were running on the local PC. Citrix specializes in "virtual workplace" technologies that offer real-time interfacing, secure delivery of data and options that minimize the need for downloading in order to access applications. Organizations can maximize investments while minimizing validation costs. Citrix allows organizations to reduce the TCO inherent to large Chromatography Data Systems implementations. With TotalChrom C/S installed in a Citrix MetaFrame XP environment, it centralizes system management, improves lab compliance with 21 CFR Part 11 and increases the overall security of the system's implementation.

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