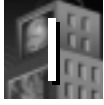

Server-based Computing White Paper



CITRIX[®]



In today's fast-paced global marketplace, the ability to provide a work force with access to the right applications and data—whenever and wherever they are needed—is indispensable for maintaining a competitive edge. Currently there are over 140 million PCs, workstations and servers installed on networks worldwide.

The Internet community has increased from 15.3 million to 68.6 million in the last two years. We have seen the introduction of numerous new computing devices from powerful servers, desktops and notebooks to Java™-based network computers, Windows®-based terminals and hand-held information appliances. And workers are now spread around the world in branch offices, homes, hotels, customer sites and many other places. The complexity and cost of delivering business-critical applications to today's worker at the right times and in the right places have become overwhelming.

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Challenges of Enterprise-Wide Application Deployment

Faced with an ever-changing computing environment, IT professionals must improve the efficiency of business-critical application deployment. In order to reduce the total cost of computing ownership for their organization, they must also leverage everything in their current computing infrastructure—hardware, applications, networks and training. And all of this must be accomplished along with:

- 1) Managing and supporting users in a timely and cost-effective manner
- 2) Extending access to business-critical applications to dispersed users—regardless of connection, location or device
- 3) Ensuring exceptional application performance
- 4) Providing tight security for enterprise-level computing

These challenges have made enterprise-wide application deployment even more daunting because the products developed to this point have only addressed one, or possibly two, of the following obstacles.

Management

From a management perspective, traditional enterprise application deployment is often time-consuming, expensive and difficult to maintain. Not only do administrators have to physically distribute applications to every client, but they also have to deal with version control issues, remote support, multiple system configurations and data replication. When confronted with thousands of users, the cost of application ownership can quickly spiral out of control.

Access

Today's corporate computing landscape comprises a heterogeneous mix of desktop devices, network connectivity and operating systems. Access to vital Windows-based applications is difficult—or, in the case of Internet/Intranet computing, nonexistent—and often involves costly upgrades, problematic emulation software and complete application rewrites.

Performance

Most corporate applications today are designed for high-bandwidth networks and powerful desktop computers. This type of application design puts tremendous strain on congested corporate networks and yields poor performance over lower-bandwidth, remote connections. Because of this, many users simply avoid using the vital applications and data to get their work done. When this happens, redundant work and significant decreases in productivity are often the result.

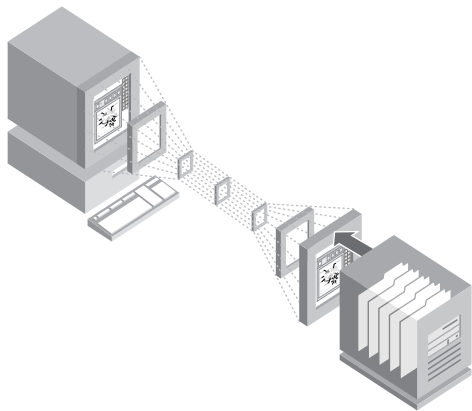
Security

Security is also a challenge, because in traditional client/server architectures, business-critical applications and data live on both the server and the client desktops spread throughout the world. Not only does this increase the risk of unauthorized access, but it also increases the risk of lost or stolen information.

A Better Approach: Server-based Computing

Server-based computing is a model in which applications are deployed, managed, supported and executed 100% on a server. It uses a multi-user operating system and a method for distributing the presentation of an application's interface to a client device.

With server-based computing, client devices, whether "fat" or "thin," have instant access to business-critical applications via the server—without application rewrites or downloads. This means improved efficiency when deploying business-critical applications. In addition, server-based computing works within the current computing infrastructure and current computing standards, and with the current and future family of Windows-based offerings. This means improved returns on computing investments—desktops, networks, applications and training. The end result: Server-based computing is rapidly becoming the most reliable way to reduce the complexity and total costs associated with enterprise computing.

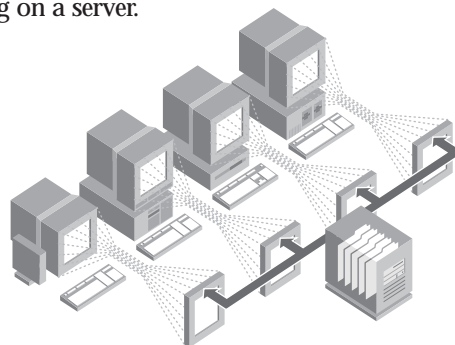


A highly efficient, remote presentation services protocol separates an application's logic from its user interface and allows only keystrokes, mouse clicks and screen updates to travel the network.

How Does Server-based Computing Work?

The server-based computing model employs three critical components. The first is a multi-user operating system that enables multiple concurrent users to log on and run applications in separate, protected sessions on a single server. The second is a highly efficient computing technology that separates the application's logic from its user interface, so only keystrokes, mouse clicks and screen updates travel the network. As a result, application performance is bandwidth-independent. The third key component, centralized application and client management, enables large computing environments to overcome the critical application deployment challenges of management, access, performance and security.

Server-based computing is made possible by two Citrix technologies: Citrix Independent Computing Architecture (ICA®) and Citrix MultiWin. A *de facto* standard for server-based computing, the ICA protocol shifts application processing from the client device to the server. MultiWin, the technology licensed by Citrix to Microsoft to jointly create Terminal Server, enables multiple users to simultaneously access applications running on a server.



In server-based computing, multi-user capabilities allow applications and data to be deployed, managed, supported and executed 100% on the server.

What Is Independent Computing Architecture (ICA)?

Independent Computing Architecture (ICA) is a Windows presentation services protocol from Citrix that provides the foundation for turning any client device—thin or fat—into the ultimate thin client. The ICA technology includes a server software component, a network protocol component, and a client software component.

On the server, ICA has the unique ability to separate the application's logic from the user interface at the server and transport it to the client over standard network protocols—IPX, SPX, NetBEUI, TCP/IP and PPP—and over popular network connections— asynchronous, dial-up, ISDN, Frame Relay and ATM.

On the client, users see and work with the application's interface, but 100% of the application logic executes on the server.

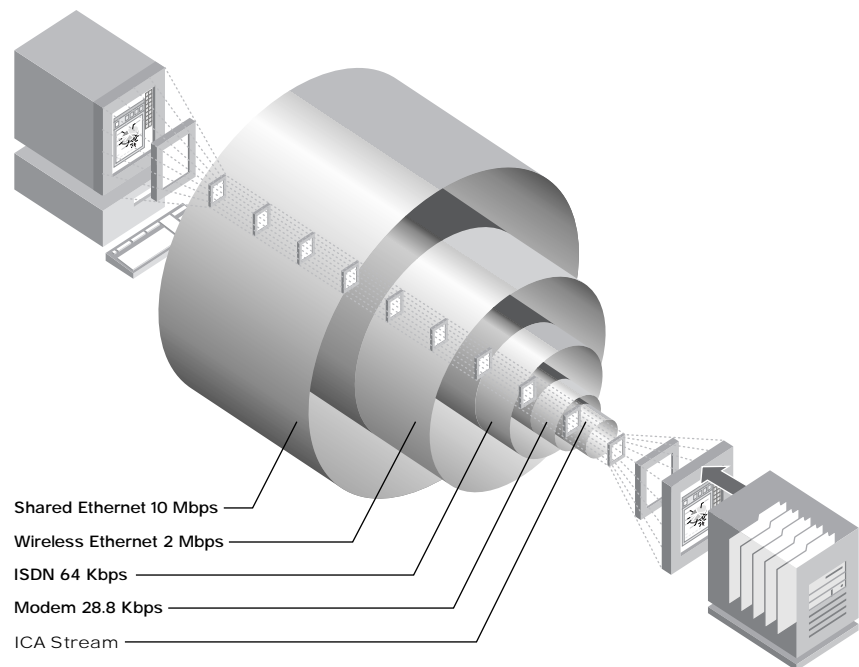
The ICA protocol transports keystrokes, mouse clicks and screen updates over standard protocols to the client, consuming less than 20 kilobits per second of network bandwidth.

Role of ICA

ICA is highly efficient—it allows only keystrokes, mouse clicks and screen updates to travel the network. As a result, applications consume just a fraction of the network bandwidth usually required. This efficiency enables the latest, most powerful 32-bit applications to be accessed with exceptional performance from existing PCs, Windows-based terminals, network computers, and a new generation of business and personal information appliances.

With over two million ports in use worldwide, Citrix ICA is a mature, reliable technology and is fast becoming a *de facto* industry standard for server-based computing.

Server-based computing provides an ideal solution for bandwidth-constrained environments. It offers users LAN-like application performance over virtually any type of connection.



Server-based Computing Compared to Network Computing and Traditional Client/Server Computing

While all three computing models have a valid role in today's enterprises, it's important to note the differences between them. In the traditional client/server architecture, processing is centered around local execution using fat, powerful hardware components. In the network computing architecture as defined by Sun, Oracle, Netscape, IBM and Apple, components are dynamically downloaded from the network into the client device for execution by the client. But with the Citrix server-based

computing approach, users are able to access business-critical applications—including the latest 32-bit Windows-based and Java™ applications—without requiring them to be downloaded to the client. This approach also provides considerable total cost of application ownership savings since these applications are centrally managed and can be accessed by users without having to rewrite them.

Some of the other differences in the three types of architectures are listed in the following chart:

Computing Architecture	Server-based Computing	Network Computing	Traditional Client/Server
Processing Model	100% Server Execution	Download and Execute	Local Execution
Hardware Footprint	Thin or Fat	Fat	Fat
Application Architecture	Monolithic, Component or 2- or 3-Tier Client/Server	Component	2- or 3-Tier Client/Server
Native Device	Variable or Fixed Function (PC, NPC, NC, WBT)	Variable Function (NC)	Variable Function (PC)
Native Application Type	Windows or Java	Java	Windows

Basically, the server-based computing approach delivers all the benefits of both host computing and personal computing.

Host Computing Benefits

- Single-point management
- Physically and technically secure
- Predictable ownership costs
- Mission-critical reliability
- Bandwidth-independent performance
- Universal application access

Personal Computing Benefits

- Thousands of off-the-shelf applications
- Low-cost and fast-cycle application development
- Standards based
- Graphical, rich data and easy to use
- Wide choice of device types and suppliers

What Is a Windows-based Terminal?

A Windows-based terminal (WBT) is a thin-client hardware device that connects to Citrix server-based system software. Because the applications it accesses are installed on the server, a Windows-based terminal is not the equivalent of a PC with its operating system and array of local applications. Nor is it interchangeable with a network computer or NetPC, because these devices download and run applications off the network.

The key criterion that distinguishes Windows-based terminals from other thin-client devices, such as NCs or NetPCs, is that there is no downloading of the operating system or applications, and there is no local processing of applications at the client. All execution of the application logic occurs on the server.

Defining Characteristics of a Windows-based Terminal

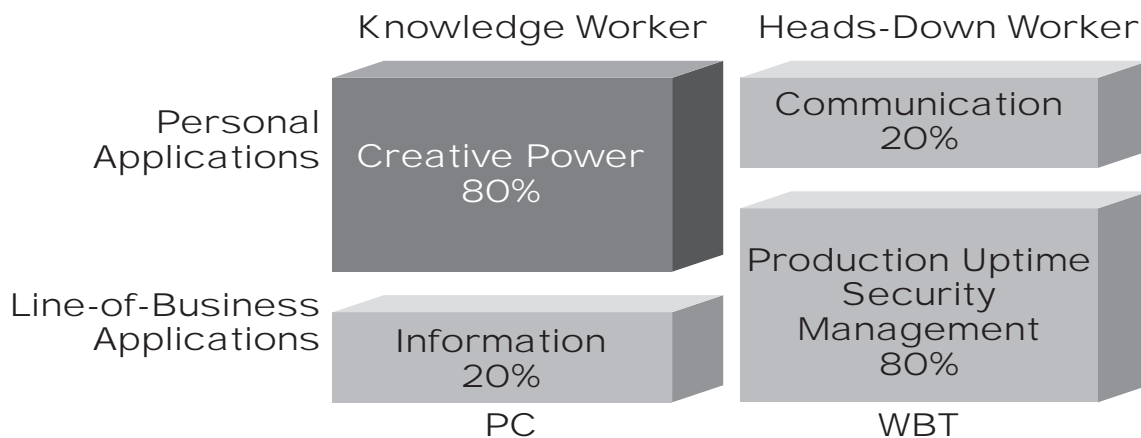
Windows-based terminals have the following characteristics:

- An embedded operating system such as DOS, Windows CE or any real-time operating system

- ICA and/or Microsoft Remote Desktop Protocol (RDP) presentation services protocol to transport keystrokes, mouse clicks and screen updates between the client and server
- 100% server-based execution of application logic
- No local execution of application at the client device
- A Windows-based terminal may incorporate third-party emulation software such as X, 3270 and 5250 for connection to other host systems

Fitting the Windows-based Terminal Within the Enterprise

The “thinness” of a Windows-based terminal and the many benefits of server-based computing make these thin clients ideal for certain types of workers and market segments. For example, task-based employees who primarily work with line-of-business applications, such as order entry, would be ideal candidates for a Windows-based terminal. Retail organizations operating point-of-sale terminals, and branch locations of banks and stores, are markets that are also rapidly adopting these thin clients. Windows-based terminals are also well suited for existing “green screen” terminal users moving to a Windows environment.

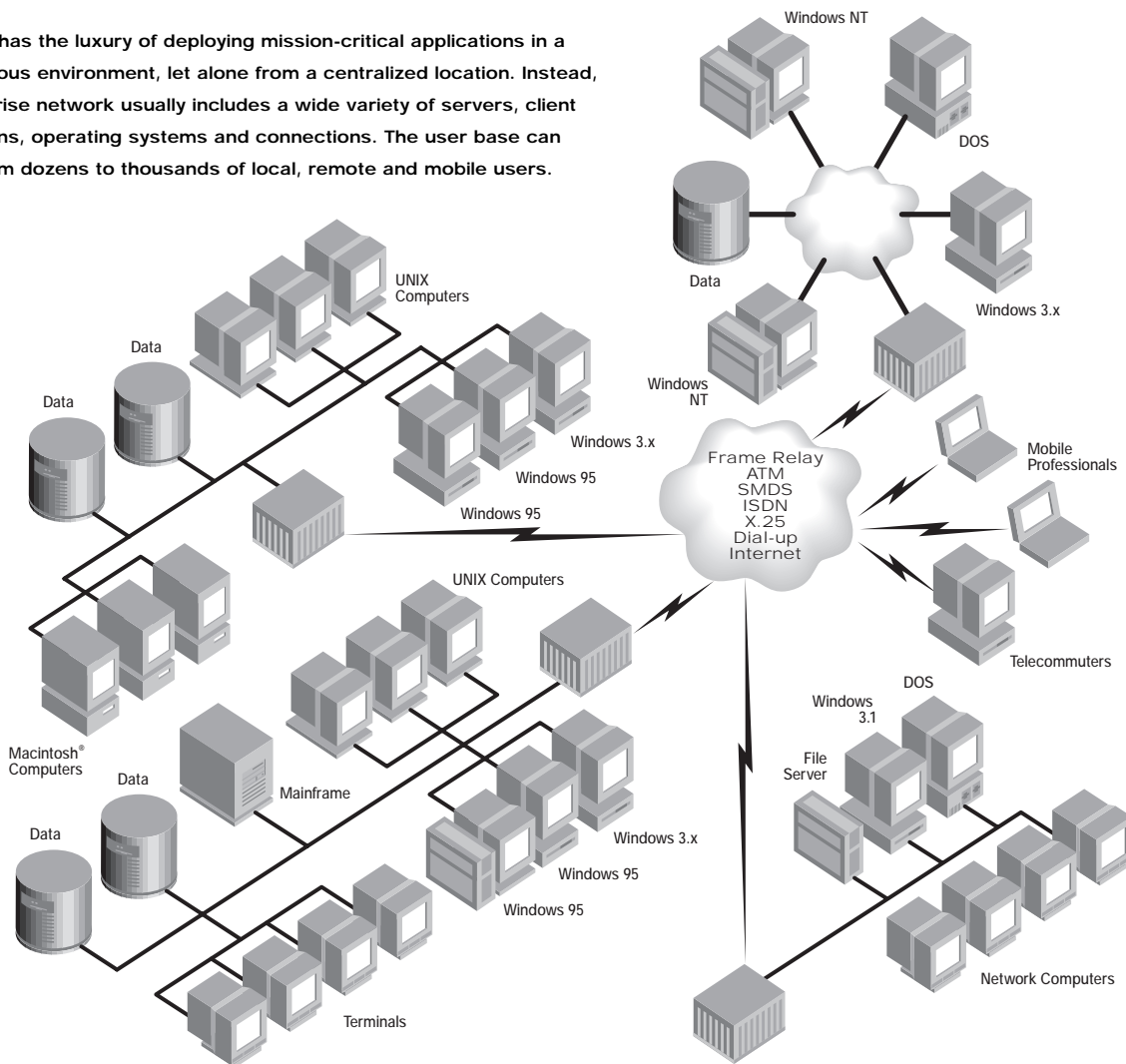


Server-based Computing Key Features and Benefits

While other approaches for deploying, managing and supporting business-critical applications across the extended enterprise have been introduced, only the server-based computing model developed by Citrix provides today's growing enterprises with the tools and capabilities they need to be successful. This innovative software enables enterprises to:

- Bring server-based computing to **heterogeneous computing environments** providing access to Windows-based applications—regardless of client hardware, operating platform, network connection or LAN protocol
- Offer **enterprise-scale management tools** to allow IT professionals to scale, deploy, manage and support applications from a single location
- Provide **seamless desktop integration** of the user's local and remote resources and applications with exceptional performance

MIS rarely has the luxury of deploying mission-critical applications in a homogeneous environment, let alone from a centralized location. Instead, the enterprise network usually includes a wide variety of servers, client workstations, operating systems and connections. The user base can include from dozens to thousands of local, remote and mobile users.



Heterogeneous Computing Environments

Heterogeneous computing environments are a fact of life in the enterprise, comprising an installed base of many client devices, operating systems, LAN protocols and network connections. However, for the enterprise interested in making Windows-based applications available to all users, server-based computing enables an

organization to leverage its existing infrastructure, yet still provide the best application fit for both users and the enterprise. This type of approach supports all types of hardware, operating platforms, network connections and LAN protocols. As a result, organizations can deliver the same set of applications to virtually any client device, anywhere, with exceptional performance.

The Citrix Approach Extends to Heterogeneous Computing Environments

Feature	Description	Benefit
Any Client Device	<p>Extends the reach of Windows-based applications to virtually any client device including 286, 386, 486, and Pentium PCs, Windows-based terminals, Network Computers, wireless devices, and information appliances as well as X-devices.</p> <p>Supports all types of Windows clients, including Windows 3.X, Windows for Workgroups, Windows 95, Windows NT Workstation and Windows CE.</p> <p>Also supports non-Windows clients including DOS, UNIX, OS/2 Warp, Mac OS and Java.</p>	Organizations can deliver the same set of applications to virtually any client device without rewriting a single line of code, changing client hardware or adjusting client system configurations.
Any Network Connection	<p>Connects users to the network through standard telephone lines, WAN links (T1, T3, 56kb, X.25), broadband connections (ISDN, Frame Relay, ATM) and wireless connections as well as over the Internet or corporate Intranets. Supports all LAN and WAN protocols, including TCP/IP, IPX, SPX, NetBIOS and direct asynchronous connections.</p>	Ideal for enterprises that need to extend applications to users everywhere—regardless of connection type or available bandwidth. For companies with multiple networks and file servers, it's a convenient and efficient way to get enterprise-wide application deployment.
Any Application	<p>Users can access the full range of business and personal productivity applications including the latest Windows-based applications, client/server, mainframe and even Java applications, from a universal client, regardless of available horsepower or operating system.</p>	Organizations can reduce the total cost of application ownership by leveraging their existing technology investments. Users are able to access the most advanced business-critical and productivity applications with their preferred devices, eliminating the expensive training normally required.
MetaFrame/WinFrame Interoperability	<p>MetaFrame and WinFrame servers are designed to coexist and interoperate on the same network. For example, MetaFrame and WinFrame can be part of the same load-balanced server farm. The same ICA clients can be used to access either server. Applications can also be published across either MetaFrame or WinFrame server farms.</p>	IT professionals can choose the most appropriate multi-user Windows NT environment based on application needs and migration plans.

Enterprise-Scale Management Tools

Organizations building application deployment systems will want the added benefits of server-based computing system software to gain robust management tools that help scale systems and support applications

and users enterprise-wide. With these tools, administrators will be able to significantly reduce the costs and complexities of deploying, managing and supporting business applications across the extended enterprise.

The Citrix Approach Delivers Enterprise-Scale Management Tools

Feature	Description	Benefit
Application Launching and Embedding (ALE)	Application Launching & Embedding allows full-function, Windows-based applications to be launched from, or embedded into HTML Web pages, without rewriting a single line of code. The application can be accessed via an ActiveX™ Control for Microsoft Internet Explorer, a plug-in for Netscape Navigator® or in a Java applet for any Java-enabled device.	Administrators can instantly integrate Windows-based applications into the user's desktop. As a result, IT professionals can extend the reach of business applications across the Web while saving time and money. The launched or embedded application looks, feels and performs as if it were running locally, even though it is executing on the server.
ALE Wizard	The ALE Wizard is an administrative utility that can automatically generate all HTML code required to effectively deploy applications using ALE.	The ALE Wizard simplifies the deployment of applications throughout the extended enterprise.
Application Publishing	Applications can now be accessed as simply as other resources on the network, such as printers or file shares. A published application contains all of the information needed to connect and interact with applications on the server. This includes application registration, user access control and authorized server lists.	Application publishing tools make it easy for administrators to deploy applications across multiple servers from a single point. Using these tools, administrators simply click to assign applications on any server to any user.
Automatic Client Update	The automatic client update utility provides for automatic updates of the Citrix ICA client from the Citrix server. This tool provides an administrator with the ability to install the latest version of the client software, then schedule the download and installation of that software to a client's device.	Administrators no longer need to worry whether an ICA client device is running the latest version of the Citrix client software. Administrators can now update the ICA client without having to touch every desktop throughout the enterprise.
Anonymous User Support	Designed primarily for ALE applications published on the Internet or Intranet, anonymous users are configured and administered as a single group. Access rights and system permissions apply to all anonymous users equally.	The use of anonymous accounts eases the administration of a published application when the exact identity of a user is not known or required, e.g., the Web.

The Citrix Approach Delivers Enterprise-Scale Management Tools (continued)

Feature	Description	Benefit
Enterprise Management Scope	Enterprise Management Scope provides the ability to manage license pools and even load balance and publish applications across subnets.	Administrators can now load balance, pool licenses and even publish applications without the limitation of subnet boundaries. Now systems and applications are even more scalable enterprise wide.
ICA Browser Manager	With the new ICA browser manager, administrators now have the ability to control browser parameters such as backup ICA browsers, ICA gateways, update and refresh intervals. Administrators can also configure which servers always attempt to become the master ICA browser.	The ICA browser manager feature simplifies browser administration through an intuitive user interface for better systems scaling and management.
Installation Management Services	The Installation Management Services option gives Citrix administrators the ability to centrally manage software replication across Citrix server farms. An administrator can simply run an application's installation routine just once, then deploy the application to each server in the farm automatically.	This innovative system services option for MetaFrame and WinFrame offers administrators an excellent alternative to manually installing and configuring the same application on multiple Citrix servers. Administrators can now more easily and cost-effectively deploy applications to thousands of users across the enterprise.
License Pool Recovery	Citrix has introduced a new backup licensing feature to better manage pooled licenses across the server farm. With this feature an administrator can define the number of backup servers to which user licensing data will be replicated.	This new addition to Citrix license pooling provides for a greater level of availability across multiple Citrix servers.
Load Balancing	The optional Load Balancing Services allow administrators to group multiple MetaFrame and WinFrame servers into scalable "server farms." It dynamically routes users to the least-busy server to deliver the best application performance and server resource utilization. Single-point management features such as application publishing, can be used in conjunction with Load Balancing to manage and configure the parameters for all load-balanced servers from a single location.	Administrators can now more easily and cost-effectively scale application servers to support thousands of users across multiple servers. This feature allows for the single-point management, access and control of all MetaFrame and WinFrame servers in a load-balanced server farm.

The Citrix Approach Delivers Enterprise-Scale Management Tools (continued)

Feature		
Program Neighborhood™	Program Neighborhood introduces a new metaphor for user application access that replaces Remote Application Manager and delivers access to centrally deployed applications. With the introduction of Program Neighborhood, server-based applications now can be pushed to the Program Neighborhood client and also be integrated into the local 32-bit Windows desktops or pushed directly into the “Start” menu programs.	Similar in concept to Windows Network Neighborhood, Program Neighborhood provides for total administrative control of applications by providing users with dynamic access to published applications. Not only do users have an enhanced server-based application experience but also no client configuration is required. Program Neighborhood provides for complete administrative control over application access and local desktop integration.
ReadyConnect™ Client	For rapid, mass deployment of applications throughout the enterprise, this feature allows the Citrix ICA client to be pre-defined with phone numbers, IP addresses, server names and connection options prior to first time installation.	All connection options are already defined. Users simply point and click to access predefined applications.
SecureICA	To help protect network data, the optional SecureICA Services for MetaFrame and WinFrame offers end-to-end RSA RC5 encryption for the ICA data stream. Both North American (128-bit) and international (40-bit) encryption levels are available.	SecureICA provides a higher, more efficient level of security between the Citrix client and the server. Organizations can ensure that data being sent over the network—even to the most remote locations—is secure and manageable.
Session Shadowing	Administrators and help-desk employees can remotely join or take control of another user’s session to see the display on the screen or control the mouse and keyboard.	This feature makes remote support, diagnosis and training easy. This feature is ideal for online interactive teaching—especially for introducing users of non-Windows clients (such as Mac and UNIX) to Windows-based applications.

Seamless Desktop Integration

With server-based computing, end users of both Windows and non-Windows desktops gain an enhanced computing experience through broadened application

access with exceptional performance that is bandwidth-independent, as well as complete access to local system resources—even though applications are running remotely from the server.

The Citrix Approach Provides Users with Seamless Desktop Integration

Feature	Description	Benefit
Audio Support	Audio compression for low-bandwidth connections allows users to extend their desktop audio schemes to remote applications running on the server.	Users now have the ability to control the quality of the audio on the client desktop to maximize bandwidth utilization.
Business Recovery Client	The Citrix ICA client now includes the additional intelligence to support multiple sites (such as a primary and hot backup) with different addresses for the same published application name.	This feature provides for the consistent connection to published applications in the event of a primary server disruption. User's now have an even higher level of fault tolerance and seamless user experience.
Client Print Manager	This new client-printing enhancement allows users to define which client printers can be configured on their client device. It provides a means to store printer properties on a per-client basis while simplifying printer configuration for non-Windows clients.	This feature provides for an even higher level of seamless experience giving users additional flexibility and access to local system resources.
Drive Mapping	Allows information derived from a server application to be saved to a user's local hard drive. Users can also drag-and-drop to copy files. Drive letters are configurable and long filenames are supported.	This feature provides a seamless user experience by giving the user more flexibility and access to all local system resources including fixed and removable disk drives.
ICA Client Enhancements	ICA Client enhancements include Windows 32-bit TAPI support, TAPI emulation for DOS and 16-bit Windows desktops, Windows COM Port Redirector, international keyboard support and 256-color DOS client support.	These features provide a seamless user experience, giving users more flexibility and access to all local systems and resources.
Local/Remote Clipboard	Users can cut, copy and paste information via the Windows clipboard between applications running remotely on the server or locally on the desktop. This feature also supports Rich Text Format.	Local/Remote Clipboard provides the familiarity of a local desktop, minimizing end-user training requirements while maximizing productivity. Additionally, the Rich Text Format preserves formatted text (e.g., bold and underline).

The Citrix Approach Provides Users with Seamless Desktop Integration (continued)

Feature	Description	Benefit
Port Mapping	Utilizing COM ports on the client device just as if they were on the server, Port Mapping enables peripheral devices, such as point-of-sale scanners, to be accessed by applications running remotely from a server.	With this feature, mobile users have the ability to access local printers to print remotely, regardless of location.
Printer Mapping	Users can transparently access their local printers. Client printers are configured automatically for Windows-based clients and are added to the Print Manager.	Mobile users can print remotely, regardless of location.
Seamless Windows	The Citrix ICA client for 32-bit Windows desktops enables seamless integration of remote applications into a client's local Windows desktop. Within a single session, a user can gain access to multiple applications, have fully functional local keyboard controls (such as ALT-TAB), switch between local and remote applications on the local taskbar, define remote application icons on the local desktop, and even tile and cascade local and remote application windows.	These unique ICA features allow the user to fully integrate local and remote application windows, providing a true, seamless user experience. A user no longer needs to access an entire remote desktop to run multiple, remote Windows-based applications in the same session.
SpeedScreen™ 2	SpeedScreen 2 builds upon intelligent agent technology that reduces the transmission of frequently repainted screens. In comparison with earlier versions of this technology, Speedscreen 2 bandwidth consumption is on average reduced by 25-30%, and total packets transmitted cut by up to 60%—resulting in significant improvements in measured speed on restricted bandwidth connections.	SpeedScreen 2 furthers the user experience with consistent performance regardless of network connection by reducing latency and improving the feel of the server-based application.
Video Ready	The video-ready capabilities of MetaFrame 1.8 or WinFrame 1.8 software enable the production and deployment of custom video applications to 32-bit Windows ICA clients using an innovative intelligent compression and a streaming extension to the ICA protocol. An optional Citrix product is required for this functionality.	By integrating video technology into a Citrix server farm, administrators can now deploy custom video applications to any 32-bit Windows desktop—on demand—while maintaining consistent performance across any network connection, regardless of available bandwidth.

Server-based Computing Solution Scenarios

With server-based computing, customers can increase productivity and develop a competitive advantage by gaining universal access to the business-critical applications they need to operate successfully, regardless of the connection, location, or operating systems they may be using.

The following solution scenarios demonstrate how server-based computing can help customers overcome the challenges of enterprise-wide application deployment.

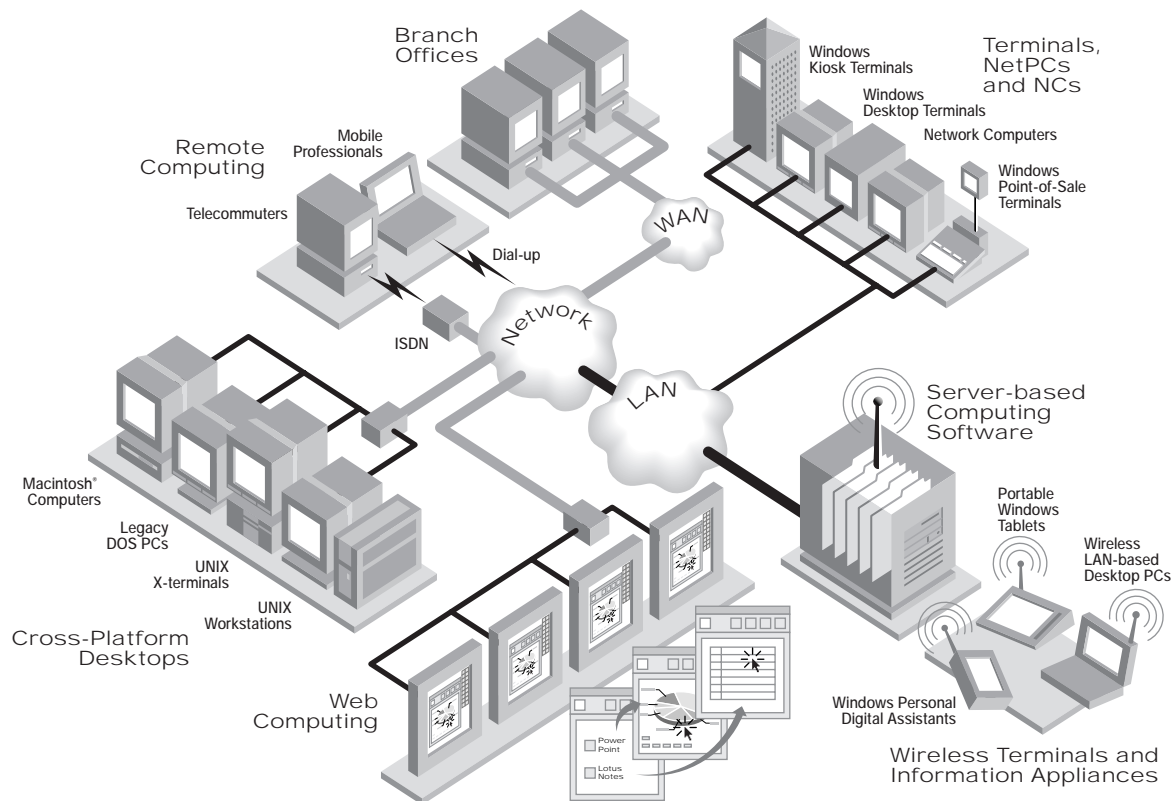
Branch-Office Computing—for manageable, secure application deployment and access over corporate WANs.

Cross-Platform Computing—for Windows-based application deployment to non-Windows desktop users.

Web Computing—so remote users can access full-function Windows-based applications from Web pages.

Remote Computing—to give high-performance, secure access to business-critical applications over remote, dial-up connections.

Thin-Client Device Computing—so vital, Windows-based applications can be extended to newer, low-cost devices.



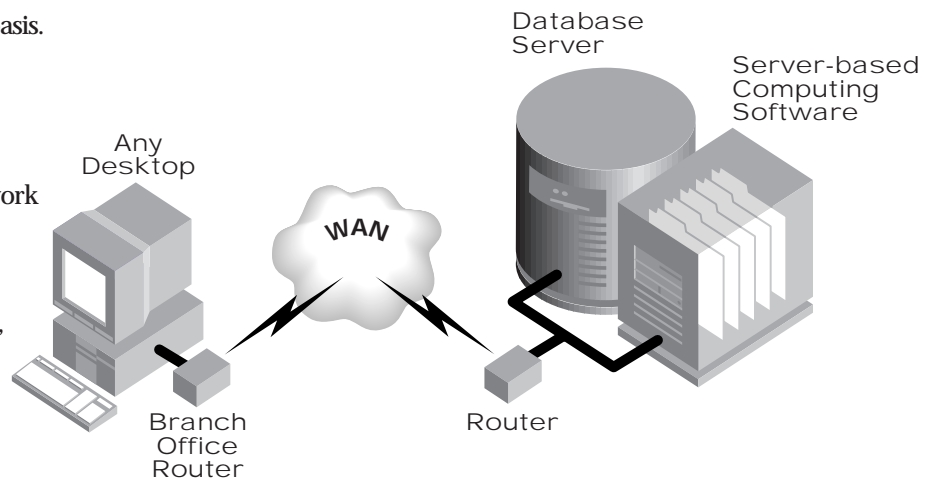
Branch-Office Computing

Problem

To better serve and support customers, many enterprises are opening branch offices. However, this is creating many difficulties for administrators who do not have the resources to adequately staff these new offices. One such problem is database replication. Many times, individual LANs are built for each branch office. Configuring and managing these branch-office LANs—and the information on them—creates numerous management challenges. Another problem is application performance. Since most branch offices are connected by WANs to headquarters, vital data and applications must travel back and forth across the network. This type of setup creates numerous user delays and unacceptable application response. Previously, the only option was a bigger WAN connection, which meant increasing costs, not just once, but on an ongoing basis.

Solution

Server-based computing is a better solution because it minimizes network traffic, even for Windows-based, 32-bit applications. This approach allows applications to be deployed, supported and managed from a central location.



Branch-Office Computing Options

	Server-Based Computing Approach	Replicated Database	WAN Connected
High Performance	●	●	○
Easy to Manage	●	○	○
Efficient Support	●	○	○
Secure Data	●	○	○
Network Efficient	●	○	○

Cross-Platform Computing

Problem

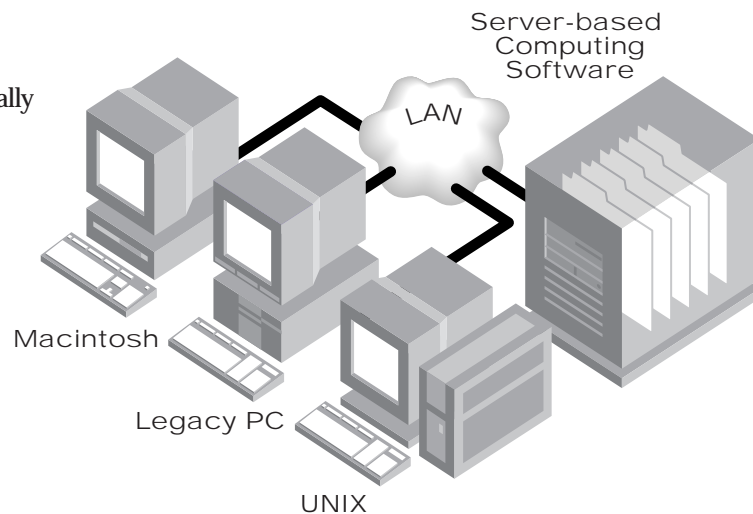
In today's era of global consolidation, many enterprises are buying and/or merging new companies into their organizations, as well as adding their own new employees and locations around the world. Typically, this has resulted in a widely diverse set of client devices, operating systems, processing power and connectivity options across the enterprise.

For IT professionals, trying to leverage existing technology investments while deploying business-critical applications—especially the latest 32-bit Windows-based applications—to all users has become more and more difficult. As a result, organizations have had to resort to using problematic emulation software, purchasing additional hardware, investing in costly application rewrites.

Solution

Server-based computing is a better, more cost-effective solution because it enables virtually any existing device in the enterprise to access Windows-based applications without special emulation software, changes in system configuration or application rewrites. This means that enterprises can maximize their investment in existing technology and allow users to work in their preferred computing environments.

	Server-Based Computing Approach	Additional Hardware Required	Redeveloping Applications	Local Windows OS Emulation
Easy to Manage	●	○	○	○
Easy to Support	●	○	○	○
Limited Hardware Requirement	●	○	○	○



Web Computing

Problem

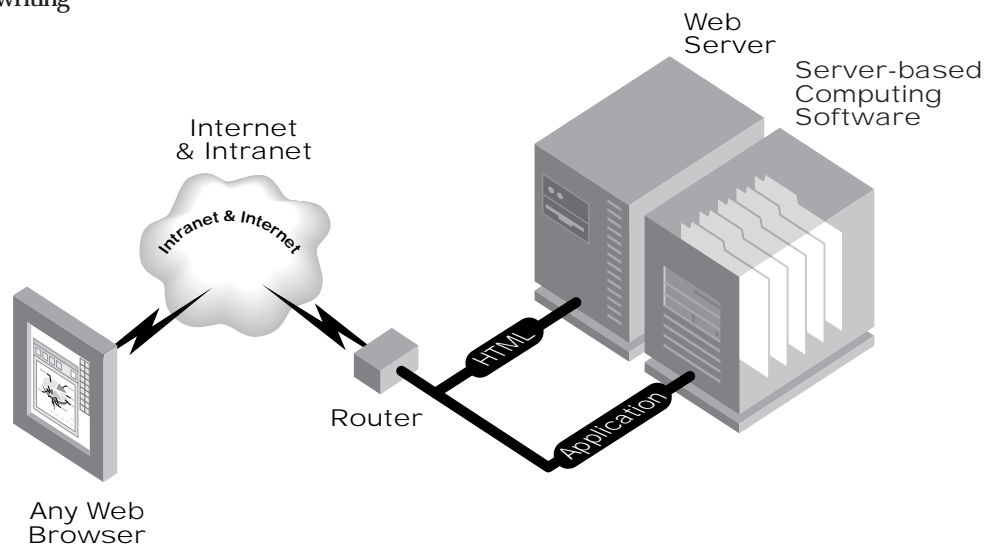
Web computing is taking off. But to deploy interactive applications on an Intranet or the Internet, application development is required.

The Java applet “download-and-run” model is not an extension of any current computing technology. New software and often new hardware are required to successfully deploy these solutions. Every time the application changes, the Web-based application needs to change as well.

Solution

Server-based computing enables administrators to launch and embed corporate Windows-based applications into HTML pages without rewriting a single line of code. Plus, it eliminates the need to manage and maintain two separate sets of code.

Web Computing Options			
	Server-Based Computing Approach	Java Applet	HTML Forms
No Application Rewrites	●	○	○
Application Feature Flexibility	●	○	○
Runs on Existing Hardware	●	○	●



Remote Computing

Problem

The changing work environment is allowing more and more employees to work away from the office—at home, hotels, customer locations, etc. This means that a wide variety of network connections are being used to access corporate applications. Unfortunately, the lower the bandwidth, the lower the application performance. Because of this, many remote users are avoiding corporate applications altogether, as they'd rather work than wait.

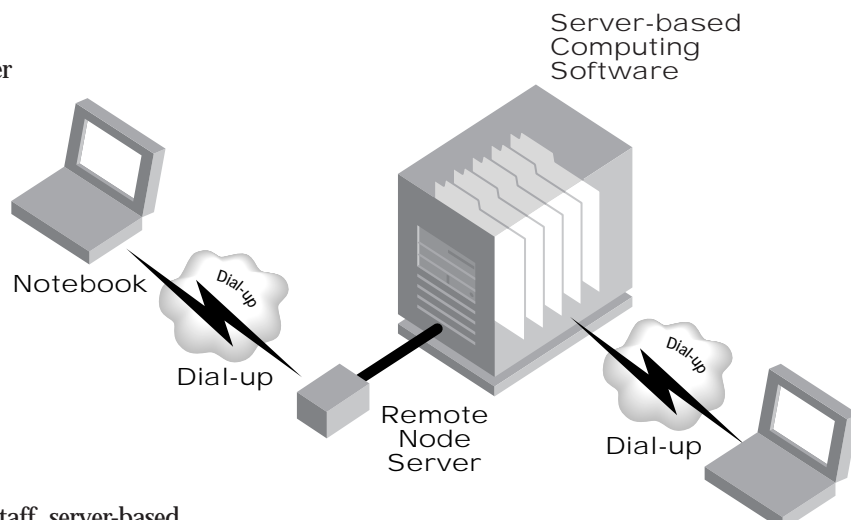
Another factor is application management and support for remote users. Administrators are forced to spend excessive amounts of time trying to diagnose and correct problems over the phone. Unfortunately, the problems are usually not resolved the first time.

Solution

Server-based computing works better for remote users because it keeps all application processing on the server, meaning less traffic is sent across the network. Plus, it's optimized for low-bandwidth connections so users can get LAN-like performance over analog or ISDN modems, WANs, wireless LANs and even the Internet.

By eliminating the need for on-site staff, server-based computing also makes it easier for administrators. They can deploy and manage vital applications and support remote users—all from one location.

	Server-Based Computing Approach	Remote Control	Remote Node
High Performance	●	○	○
Easy to Manage	●	○	○
Easy to Support	●	○	○
Secure Data	●	●	○
Limited Hardware Requirement	●	○	○



Thin-Client Device Computing

Problem

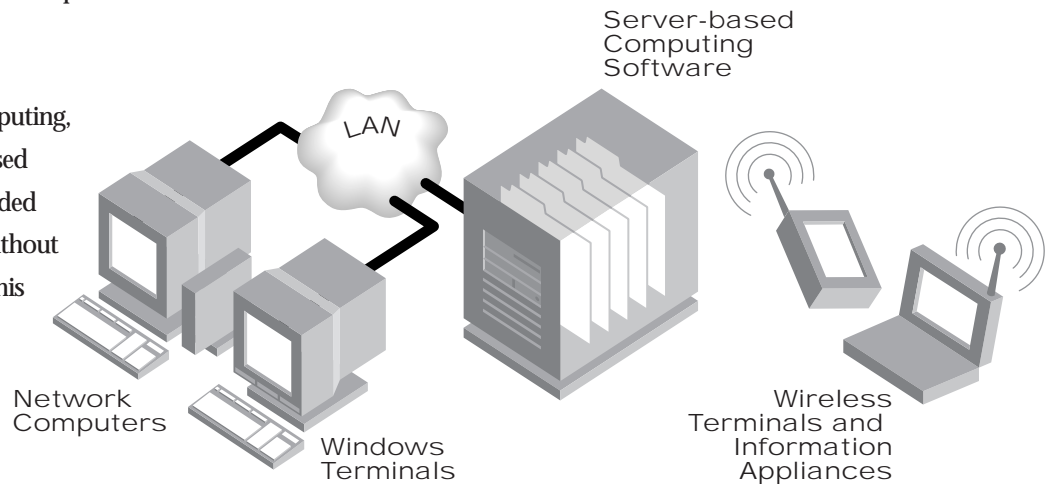
Traditional mini- and mainframe computing deliver some of the same “centralized computing” benefits as server-based computing. The problem is that these types of machines weren’t designed for the thousands of GUI-based Windows applications that are available today. Furthermore, users on these types of machines are familiar with the text-based interface and are typically slow to adopt new operating systems.

Also, many of today’s new devices—like Windows-based terminals, PDAs, wireless tablets, and information appliances—are not compatible with the Windows-based, business-critical applications being used in the enterprise unless rewrites are performed.

Solution

With server-based computing, the latest Windows-based programs can be extended to these thin devices without application rewrites. This enables users to work in their preferred environments and still access the Windows-based applications they need to work successfully. Plus, organizations can reap the benefits resulting from reduced overhead, lower acquisition costs and fewer moving parts.

Thin-Client Device Options		
	Server-based Computing Approach	Network Computing
No Application Rewrites	●	○
Runs Existing Hardware	●	○
Network Efficiency	●	○
Secure Data	●	○



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