Server-based computing comes of age.

Business and technology benefits of Microsoft, Citrix and Compaq solutions.
Executive summary.

The typical enterprise is built on a heterogeneous collection of technology platforms, hardware devices, software and connection protocols. For companies to effectively communicate — and successfully compete — in today’s challenging business environment, these diverse elements must be integrated into a seamless digital network that gives management, employees, clients, partners and vendors instant access to business-critical applications and data.

Today’s IT professionals face the daunting challenge of integrating this cohesive digital network.

Leading hardware and software vendors have responded to this challenge by developing innovative technologies that offer virtually unlimited access to applications and data. The model is called server-based computing. This approach has been widely proven to deliver applications throughout the enterprise and around the world to virtually any device, independent of platform barriers. In addition, the server-based strategy simplifies the complex task of managing diverse computing resources.

Computing solutions from Microsoft, Citrix and Compaq make this approach possible. Working closely together for years, these three industry leaders have realized the potential of the “virtual workplace” — an infrastructure that spans LANs, WANs, the Internet, Intranets and Extranets to provide access to any application from any device over any connection, wired, wireless or Web. With server-based infrastructures built on Microsoft®, Citrix and Compaq technologies, businesses have proven answers to the access, performance, reliability and productivity questions that they face today and will continue to face into the future.
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Enterprises in the digital world are increasingly decentralized. While they maintain headquarters in terms of an address, office suites and even a primary IT infrastructure, business today is often conducted in the field—from branch offices, home offices, client facilities, call centers, hotel suites, the Web—wherever opportunity is found.

**Managing the technology mix.**
Partly as a result of its decentralized nature, the mature enterprise is built on a heterogeneous mix of operating systems, applications, hardware and related technology. Employees use a broad range of devices—desktop PCs, laptops, Windows®-based terminals, green-screen terminals, Macintosh® computers, UNIX® workstations or even small-form-factor devices such as PDAs and cell phones—to access business-critical applications and information.

Many of these workers conduct business in locations far removed from conventional access to a central IT infrastructure. In response to this decentralized workforce and the mainstream adoption of a wide range of devices, methods of connecting to the central infrastructure have evolved to include wired, wireless and Internet-based options.

**The IT dilemma.**
As enterprise networks evolve, they become increasingly difficult to manage. They also require the considerable expense of more computing power and a larger IT staff. In most cases, management wants to control spiraling IT costs. IT must balance available bandwidth against the ever-expanding flow of rich content. And end users are demanding new levels of reliability and access to business-critical information.

Additional factors further complicate the picture. Challenging economic times require IT to do more with less. Task-based workers have different access and computing needs than knowledge workers. And many organizations have an aging inventory of desktop devices and networked terminals that offer only limited access to rich Windows- and Web-based applications. These trends present enterprise IT departments with a substantial technology challenge: They must seamlessly—and cost effectively—deliver a broad range of applications and data through a disparate collection of client devices, platforms and connections. This challenge far exceeds the ability of traditional information access technology to deliver an effective solution.

**The economics of simplicity.**
Server-based computing offers a solution to this challenge. The model is based on a highly efficient, platform-independent approach that transfers both application and information processing from client devices to a central server. From this central infrastructure, IT professionals can deliver virtually any application to any device across any connection.

In server-based computing, 100 percent of all application execution occurs on the server. Only mouse clicks, keystrokes and screen updates cross the network. Because no substantial data is moved, bandwidth is conserved and security is enhanced. And from a single point of control, IT can extend its reach beyond LANs and WANs to branch offices, telecommuters and mobile workers. The strategy streamlines management, deployment and support of standard office, productivity, Web and even custom applications.
Pioneering solutions.
A comprehensive server-based computing solution requires three critical elements: a robust operating system at the client and server, enterprise-class application serving and management software, and hardware designed for the rigors of server-based computing.

As the pioneering leaders in application-serving technology, Microsoft, Citrix and Compaq have worked together to deploy more than 100,000 server-based installations for enterprises around the globe. This experience has enabled each partner to continually evolve its processes, products and services to meet the real-world demands encountered in server-based computing.

Citrix and Microsoft enjoy a long and productive relationship that originated with the joint development of Microsoft Windows NT® 4.0, Terminal Server Edition and Terminal Services for Windows 2000 Server. The companies maintain an ongoing working relationship and work closely together in strategic sales, marketing and support initiatives. In today’s server-based deployments, Microsoft products offer the operating system required to run Windows-based applications while Citrix technology extends this functionality to add manageability, enterprise-class scalability, security and support for application publishing portals.

Specialized products and services.
Compaq was among the first hardware vendors to recognize the value inherent in a server-based computing strategy. The company leverages well-established strategic relationships with Microsoft and Citrix to optimize its products for the server-based computing environment. In fact, Compaq maintains an engineering lab dedicated to testing Microsoft Terminal Server and Citrix® MetaFrame™ on its server, desktop, notebook and thin-client devices.

Compaq is the only hardware manufacturer with a professional services group dedicated to server-based computing. This group works with experts from Microsoft and Citrix through Compaq Thin Client Server Competency Centers, where customer organizations benefit from one-stop shopping, support and services.

Bottom-line benefits.
Four technical challenges consume over 90 percent of the typical IT budget: network administration, informal administration, hardware acquisition and software upgrades. Server-based computing centralizes IT control, simplifying network management and requiring fewer IT resources. The strategy extends the life of legacy hardware, which delays the need for new equipment. Finally, centralized control dramatically speeds the deployment of new and custom applications for a faster return on software investments.

Thousands of large enterprises in financial services, banking, manufacturing, services industries, government, education and healthcare have successfully deployed server-based computing strategies. According to Zona Research, these organizations realize an average 55 percent cost savings annually over their previous systems. Server-based computing is the fastest, simplest and most cost-effective method of extending the enterprise across technologies and geographies.
Microsoft: access from Windows-powered devices.

The Windows platform enables business computing in enterprises everywhere. For millions of users, Windows is about empowerment and increased productivity, driven by access to productivity and line-of-business applications on servers, PCs, notebooks, PDAs and an ever-increasing variety of Windows-powered devices.

Today, many businesses are turning to server-based computing to make their Windows-based environments more productive and efficient than ever before. In the server-based model, technology administrators can extend Windows applications to clients without physically installing the application on each device. This centralized deployment saves IT administrators significant time and effort.

**A server-based foundation.**

The Microsoft Windows 2000 Server family of products delivers the fundamental, enabling platform for server-based computing solutions. The Terminal Services component built into Windows 2000 Server gives users access to applications and services deployed to Windows-powered devices over network connections.

A variety of tools and utilities are integrated into Terminal Services to enhance ease of use, manageability and security. These include a revised cache scheme for improved performance and a remote control feature that allows administrators to shadow user sessions in training or troubleshooting. Connection, license and configuration managers streamline system administration. Security features include advanced encryption technology, log-on attempt limits and centrally defined access restrictions.

**Client-based cost savings.**

Microsoft also provides a family of products that enable client devices for server-based environments. Windows 2000 Professional PC, the desktop operating system for business users, supports a broad range of applications and peripherals, enabling businesses to maximize the flexibility and functionality of their PCs.

One significant benefit of server-based computing is that client devices do not have to be capable of processing sophisticated locally installed Windows applications to access and use them. Because a powerful central server handles all execution, processing and data storage, the client device is required to manage only displays, mouse clicks and keystrokes.

The Windows-based Terminal Server platform is designed to power thin clients—simple devices without moving parts or spinning media—that are designed primarily to access server-based applications. Customers in industries where harsh operating environments preclude the deployment of PCs or where task-workers require a simpler terminal-like client device have deployed large numbers of Windows-based terminals in conjunction with productivity or line-of-business applications running on Terminal Server.

Windows-powered thin clients such as Windows-based terminals leverage an embedded Windows operating system such as Windows CE or Windows NT Embedded to provide users with the familiar Windows look and feel. These component-style operating systems allow device manufacturers to embed Terminal Server client protocols, Internet Explorer browser, terminal emulation and simplified task-oriented user interfaces into thin-client devices that deliver a simple, cost-effective complement to fully configured PCs.
Citrix: powering the virtual workplace.

Citrix provides a suite of products that are integrated with Microsoft operating systems to extend access to Windows-based applications across enterprise environments. Citrix enables organizations to create a virtual workplace—a seamless work environment that leverages the emerging digital network to provide access to any application from any device over any connection—wired, wireless or Web.

**Enterprise manageability and scale.**

Citrix MetaFrame XP™—the latest member of the MetaFrame application server software family from Citrix—runs in tandem with the Terminal Services component of Windows 2000 Server to provide a management environment for server-based computing deployments. At the heart of Citrix MetaFrame XP is the notion of a server farm—a collection of independent servers coordinated through a single command and control point. Using Citrix MetaFrame, IT organizations can scale to meet increased capacity demands through the addition of coordinated servers.

Citrix MetaFrame XP enables IT to efficiently scale to meet the need for increased user capacity by simply adding servers under this central point of control. Citrix software manages and distributes application load, user and application access, printer and even license management.

**Networking the Web.**

The pervasive reach of the Internet makes it a logical conduit for extending large-scale application deployments to employees, partners, suppliers and customers. However, many applications are not designed for use over the Web and require substantial rewrites to function in this environment.

Citrix NFuse™ is an enterprise Web portal product that integrates and publishes interactive applications for access through the Web—without requiring code rewrites. Bundled with Citrix MetaFrame XP or available as a free download from Citrix for use with earlier versions of Citrix MetaFrame, this integration technology allows IT professionals to deliver Web-based access to applications and information from any client device equipped with a standard Web browser.

**Integrating non-Windows devices.**

Companies using Citrix MetaFrame can leverage their investments in existing user platforms by allowing devices running on virtually any platform—Windows, UNIX, Java™, MS-DOS® or Macintosh OS—to access and interact with server-based applications.

The Citrix approach extends Windows functionality to address the specific needs of the large enterprise. These needs include support for server farms, application publishing, portal strategies and enhanced manageability. Citrix MetaFrame features an administration console with a single systems image, along with integrated load, resource and installation management capabilities.
In the server-based computing model, servers bear the entire application and information processing load. A task-appropriate server must be scalable, highly reliable, powerful and manageable. It must represent a solid value in both purchase price and long-term maintenance costs. And it must offer broad compatibility with industry standards. Compaq provides a wide selection of servers, personal computers and thin-client devices that are well suited for use in the server-based computing environment.

**Performance beyond power.**
The Compaq ProLiant™ family of servers offers performance and flexibility optimized for server-based computing. Expandable memory, a range of bays and expansion slots, and an array of removable media support scalable, customizable configurations. ProLiant servers with a rack-mount form factor make efficient use of the limited space encountered in server rooms.

Because all system users depend on a central server, uptime is critical to a successful server-based computing strategy. Compaq addresses this issue with a range of redundancies in memory, drive, power supply and controller systems. A central server also concentrates management and control. ProLiant servers are equipped with management and diagnostic software that eases system maintenance.

**End-to-end hardware.**
In addition to the Compaq Deskpro™ line of desktop PCs, Compaq offers the T1010 thin client specifically designed for use in server-based computing environments. This unit provides an extensive feature set designed to display rich Windows-based applications from the central server. Equipped with Microsoft Internet Explorer browser, the T1010 gives users easy access to the Web. This robust, Windows-powered device simplifies the computing environment by reducing support and configuration requirements. The T1010 offers an inexpensive alternative to desktop PCs in task-based work environments.

Compaq iPaq™ desktop devices and Compaq Evo™ and Compaq Armada™ notebooks are additional small-form-factor devices that bring ease of deployment, ease of support, usability and low cost to the server-based computing environment.
Teamwork breeds a comprehensive solution.

Deploying a server-based computing solution requires careful analysis of business goals, application requirements, IT resources and long-range plans. It also requires the expert support that only experienced insiders can offer. As the pioneering leaders in server-based computing, Microsoft, Citrix and Compaq have built a strong base of experience that enables them to successfully meet the needs of clients seeking to deploy server-based solutions.

**Setting the standard.**
Several key advantages position Microsoft, Citrix and Compaq solutions as the de facto standard in server-based computing. Compaq maintains a hardware testing lab dedicated to fine-tuning its server products to run Microsoft Terminal Server and Citrix MetaFrame. On the software side, the Compaq Professional Services staff includes more Microsoft Certified Windows NT engineers than any other hardware vendor, a fact that underscores the Compaq commitment to Windows-based computing. The company’s partnership with Citrix provides expert, comprehensive insight to Citrix processes, methodologies, software and tools.

**Expert insight and support.**
These combined resources benefit both current and prospective customers in several important ways. Evaluating configurations and applications before they are deployed requires extensive capabilities. Compaq Competency Centers provide the hardware, software and personnel resources required to model and test a realistic solution. Each center is staffed by experts schooled in Microsoft, Citrix and Compaq technologies and dedicated to helping enterprise customers build, service and manage an effective server-based infrastructure. Compaq provides live 24x7 support, which is supplemented by its worldwide base of certified solution resellers.

Compaq also maintains Compaq ActiveAnswers™ — an interactive Internet community comprised of enterprise customers, independent software vendors, channel partners and systems integrators well versed in server-based computing solutions. ActiveAnswers also provides guides to planning, deployment, operation and maintenance for the entire life cycle of the server-based solution. Application-specific sizing tools, system-specific configuration tools, tailored e-services and a regularly updated collection of white papers complete the ActiveAnswers support system. Comprehensive solutions and support from the leaders in server-based computing ensure a quality project that builds the bottom line.
Solution in action: Memorial Hermann Hospital.

Memorial Hermann Hospital is a 500-bed acute care facility and Level I trauma center in Houston, Texas. Its staff depends on Cerner Healthcare’s HNA Millenium patient care application to manage electronic medical records, schedule patients and review the physician results generated by 40,000 annual admissions. The Cerner application is critical to patient care and essential to efficient hospital operation — facts that demand 24x7 accessibility.

“The application has got to work,” says Damon Small, the hospital’s network administrator. “You can live without e-mail, but patients won’t live without proper care.”

The need for integration.
To provide the seamless application services that its medical staff required, Memorial Hermann Hospital needed an IT infrastructure that would integrate many different accumulated technologies — including back-end database servers, application servers, database systems software, networking and client devices. The hospital’s primary objectives were to reduce the cost and downtime associated with maintenance and administration and to simplify the complex task of implementing upgrades across the system’s 800-plus desktop computers.

Memorial Hermann turned to a cooperative application-server solution created by Microsoft, Citrix, and Compaq. Based on 20 Compaq ProLiant 5500 servers attached to Compaq AlphaServer™ Systems hosting Oracle® databases on the back-end, the solution uses Microsoft Windows Terminal Server and Citrix MetaFrame to deliver seamless application access throughout the hospital.

Savings and performance.
The results have proven outstanding. Major upgrades that once required 36 hours of downtime can now be completed in less than five hours — and no downtime. It takes only five IT staff members to administer the system, and client performance is up dramatically. For example, patient records are now displayed in three seconds as opposed to the previous 35 – 40 second wait. IT support has improved and user satisfaction is high.

The substantial cost savings delivered by the system can be attributed to reduced staffing requirements and the more efficient use of hardware and software. Though not readily quantifiable, improved staff efficiency adds to these savings. But most importantly, care providers now have fast, dependable access to the most current medical records available, ensuring that patients at Memorial Hermann Hospital receive prompt, accurate care.
Conclusion.

IT professionals in today’s enterprises are asked to deliver virtually unlimited access to a broad range of software applications and data — anytime, anywhere through any device. However, the heterogeneous nature of the hardware, platforms and connections that must be accommodated make this a daunting task. As system complexity grows, so do the challenges of management, maintenance and providing easy client access.

The pioneering leaders of server-based computing — Microsoft, Citrix and Compaq — have addressed these issues head-on. In addition to offering their own products, the three companies have integrated their solutions to collaboratively deploy over 100,000 server-based computing installations.

The results of these installations prove the merit of a server-based IT strategy built on Microsoft, Citrix and Compaq technologies. Applications and data are readily delivered to any device across any connection, enhancing productivity and building user satisfaction. Application deployment and management are centralized, speeding user benefits and reducing support requirements. System reliability and security are improved. And in many cases the life of existing hardware is extended to delay or even eliminate the expense of new equipment.

The expertise and technologies provided by industry leaders Microsoft, Citrix and Compaq combine to connect people, devices and information throughout the digital world.

Footnotes.

1. Intelliquest
2. As quoted on Boundless Technologies website www.boundless.com/Thin_Client_Products/About_Thin_Clients/TCO_Calculator

For additional information.

To learn more about Microsoft, Citrix and Compaq server-based computing solutions visit the following websites:

www.compaq.com
www.compaq.com/showroom
www.microsoft.com/windows2000
www.microsoft.com/windowspowered
www.citrix.com

Or contact your local Compaq sales office:

1-800-282-6672, press 5, then mention code MDT.