
VIVIDESK™

Frequently Asked Questions about the

VIVIDESK Desktop

by iW Technologies Inc.



Copyright © 1995-2002 iW Technologies Inc.

All rights reserved

iW Technologies Inc. software, methods and Internet Services are developed, distributed and maintained by iW Technologies Inc. Unless stated otherwise, all information and all material in iW Technologies Inc. business plans is protected by copyright and must not be captured, downloaded, copied or altered without permission.

This document may not be copied or distributed without permission.

Microsoft is a registered trademark and Internet Explorer, Windows, Windows95, Windows98, WindowsNT and Windows2000 are trademarks of Microsoft Corporation.

Information contained herein is the property of iW Technologies Inc.

iW Technologies Inc.

1300 Merrill Lynch Tower
Edmonton Centre
Edmonton, Alberta T5J 2Z2

Telephone

1-866-263-5887

Fax

(780) 414-1633

E-mail

info@vividesk.com

Internet

<http://www.vividesk.com>

VIVIDESK Systems FAQ

Infostructure	3
What computer Hardware is required?	3
What are the minimum hardware requirements for the VIVIDESK client?.....	3
What are the minimum hardware requirements for the VIVIDESK server?	3
What operating systems are supported?	5
Are different versions of VIVIDESK required for different versions of Windows?.....	5
What Software types are supported?	5
What Internet technologies are supported?	7
What database products are supported?	7
What software incompatibilities are known?	7
What workstation user privileges are needed to install VIVIDESK client software?.....	8
What is the level of fault tolerance?.....	8
Security	10
What types of security needs are addressed by VIVIDESK?.....	10
How are users authenticated?	11
Can password format and longevity rules be enforced?	12
How are users authorized?.....	12
Can security be set at the individual user level?	13
Can the system assign users to roles or groups, and assign security at that level?..	13
Can administrative roles be delegated to different groups?.....	13
Can users change their passwords?	14
Can multiple applications be controlled through a Single Sign On (SSO)?	14
What SSO methods are supported?.....	14
Which hardware and software platforms support SSO functions?.....	15
Can VIVIDESK automatically close applications that it has opened?.....	15
Are SSO capabilities limited by firewall, dial-up or web-access constraints?.....	16
To what level can an administrator script into an application?.....	16
Does VIVIDESK support context management?	16
Is there complete independence between user and workstation?	16
How are messages encrypted?.....	17
How are passwords protected on VIVIDESK servers?.....	17
How are passwords protected on VIVIDESK clients?.....	18
Does Vividesk support RSA, Entrust and other security products?	18
What firewall ports are required for encrypted communications?	19
How is security integrity verified?	19
How is authentication integrity verified?.....	19
Can time-outs be set to prevent non-authenticated viewing?	20
How is non-repudiation enforced?.....	20
What audit trails are available?.....	20
Can the audit capabilities be configured for different types of users and applications?	21

Remote Windows Applications	22
Overview	22
How are Citrix Metaframe, Microsoft Terminal Server and VIVIDESK related?.....	22
Can VIVIDESK be used as a thin-Client for Citrix and Microsoft Servers?.....	23
How do Citrix, RDP and VIVIDESK technologies differ?	24
How do Citrix, RDP and VIVIDESK server management methods differ?.....	28
How do Citrix, RDP and VIVIDESK handle licensing and user fees?.....	29
Scenario #1: 50 users, 50 personal computers, 5 applications.....	29
Scenario #2: 500 users, 1000 personal computers, 100 applications	30
VIVIDESK Economies.....	31
Usage Monitoring	32
How is data collected and what is captured?.....	32
What types of usage data are tracked?	32
In what format is VIVIDESK usage data recorded?.....	33
Can audit results be displayed online?.....	33
Communications	34
Can global messages be sent out?.....	34
What is the best way to add messages and applications?.....	34
Support	36
What level of support comes with the VIVIDESK?	36

Infostructure

What computer Hardware is required?

What are the minimum hardware requirements for the VIVIDESK client?

The VIVIDESK system is an Internet, World Wide Web (WWW, Web) technology that uses a thin Internet client to manage private communications with a multi-component server running on an Internet Information Server (IIS). The client component is installed from the Internet and is then available for making connections to any number of Web servers, other Internet servers, local software on the computer workstation and one or more VIVIDESK servers.

Essentially, if a computer can run Internet Explorer™ 4.0 or more recent versions of Internet Explorer™, then it will be able to run VIVIDESK. This usually translates into the following minimum hardware requirements:

- 100 MHz central processor, or better
- 32MB memory, 64MB recommended
- Windows 95, Windows 98, Windows Me, Windows 2000, Windows XP, or Windows NT (version 3.51 and higher)
- 3 MB of hard drive space
- Internet Explorer 4.0 or higher (it is recommended that Internet Explorer 5.0+ be installed & upgraded to 128 bit encryption compatibility)
- An Internet connection (24 kilo baud or faster modem; fast Internet connection using DSL, Cable or better recommended)

What are the minimum hardware requirements for the VIVIDESK server?

VIVIDESK server functions can all be performed on a single Internet server computer configured with Microsoft Internet Information Server, version 3.0 or more recent. It is also possible to distribute VIVIDESK server functions over multiple server computers, and so balance server loads for high-volume VIVIDESK

desktops. The following VIVIDESK server functions can reside on different computers:

- **REQUIRED:** Primary VIVIDESK server (user authentication, security, single sign on capabilities).
Multiple primary servers can be set up to serve different VIVIDESK desktops or all desktops can be served from the same primary server.
- **OPTIONAL:** Secondary (backup) VIVIDESK server.
A VIVIDESK client switches over to this server if it cannot connect to its primary server in a timely fashion.
Primary and secondary servers can use the same data and communications stores.
- **OPTIONAL:** Installation and automated update server
A distinct machine can be designated to manage client installations, automated updates, and version monitoring. This is important because file uploads and downloads can be disk-intensive and can introduce delays in other server functions.
- **OPTIONAL:** World-Wide-Web server.
Desktops may link to a variety of conventional Web pages which can be stored on the same server as the VIVIDESK server or, in high use situations, can be stored on one or more separate servers.
- **OPTIONAL:** Electronic Mail server.
Desktops can integrate electronic mail communications and discussion lists with other information services. A VIVIDESK email client can be used and installed on a the same server as the VIVIDESK server software. A separate machine can also be used and other email software can be substituted for the VIVIDESK email client.
- **OPTIONAL:** Data server.
This machine can be configured with Microsoft Access 2000 or Access XP or almost any SQL database product. The primary and secondary VIVIDESK servers can share the same data server or the data server can be installed on the same machine as the VIVIDESK server. In general, projects expecting up to 200 simultaneous logons will perform well with a combined VIVIDESK/data server using an Access database. Busier projects will notice performance improvements with an SQL database engine.
- **OPTIONAL:** Remote Desktop Protocol or Citrix Metaframe server.
VIVIDESK supports Microsoft's remote desktop protocol (RDP) for running Windows applications over the Internet. The Microsoft Advanced Terminal Server client is built-in to VIVIDESK. The Citrix ICA client is also supported. Because terminal server activities can tax the processing and storage resources of a server, it is possible to designate one or more separate servers for supporting RDP applications.

Technical requirements for the VIVIDESK server(s) are determined by the network size, anticipated number of simultaneous users, and anticipated interval between archiving of VIVIDESK usage data. For a low volume VIVIDESK server setup, with up to 200 simultaneous users logged on at any one time, a single file server (Pentium 200MHz or better, 128MB RAM, 4GB hard drive) running Internet Information Server version 3.0 or Personal Web Server version 3.0, using Microsoft

Access 2000 databases, is adequate. For higher-volume configurations, multiple servers and an SQL database engine are recommended. Multiple modest-powered servers (e.g., Pentium 300MHz, 9GB SCSI hard drive, 256MB RAM) are more effective than one large high-performance Internet server.

What operating systems are supported?

VIVIDESK helps information system administrators and users get the most out of Microsoft Windows computers. To use VIVIDESK 's interface management and data collection capabilities, the VIVIDESK thin-client should be installed on Windows 95, Windows 98, Windows NT (3.51, 4, 5), Windows Me, Windows 2000, or Windows XP computers. VIVIDESK is also available in a format optimized for Microsoft Terminal Server computers, allowing it to be delivered to Macintosh and other client computers using the Microsoft Remote Desktop Protocol. A Windows CE version of VIVIDESK is scheduled for release with the version 5 series of VIVIDESK products. VIVIDESK can be used on Macintosh computers that have a software or hardware Windows emulator installed.

The single best test of whether a client computer will be able to use the VIVIDESK Internet plug-in, is whether that same computer can successfully run Microsoft Internet Explorer version 4.0 or more recent.

The VIVIDESK server computer must have Win32 capabilities.

An optional separate VIVIDESK database server can be on any operating system compatible with a Windows network.

Are different versions of VIVIDESK required for different versions of Windows?

One VIVIDESK client works on all 32-bit Windows operating systems.

VIVIDESK is programmed using the Microsoft Visual C++ development environment. All functions required to run the VIVIDESK client itself are embedded in the VIVIDESK code. Using a method called "static binding", all Microsoft Windows dependencies are also embedded in the VIVIDESK code. This spares VIVIDESK from vulnerability to changes in the Windows operating system. In addition, iW Technologies is a registered Microsoft developer, committed to ensuring VIVIDESK compatibility with any new or upcoming changes to the operating system.

What Software types are supported?

The VIVIDESK client software is designed as a software 'container' within which multiple optional 'viewers' can be configured. VIVIDESK has the default capability of loading, displaying and managing Windows, Internet, Remote Desktop, Citrix ICA client, VT100 and VT200 software types. VIVIDESK supports any Internet software (local or networked) that will run in Internet Explorer version 4 or later. This includes ActiveX, Java, XML and Javascript applications. In addition, custom software viewers can be added to meet unique information delivery needs (e.g., IBM 3270 terminal emulation).

The following software types are accessible through any VIVIDESK client:

- **Local Windows Applications**
Any software application that can be executed on the client Windows operating system workstation, can be initiated, controlled, scripted, and monitored by VIVIDESK. This includes legacy DOS applications (run through the Windows command console), 16-bit Windows 3.1 applications, 32-bit Windows applications and any other software adapter that is installed on the local computer workstation (e.g., custom terminal emulators). VIVIDESK can send keystrokes and mouse events to any application it initiates, even though that application is running on the local computer. It can also monitor keystrokes and mouse events for auditing purposes.
- **Remote Windows Applications**
The VIVIDESK client can start, automatically sign on to, script and monitor Windows applications run remotely over the Internet using Microsoft's Remote Desktop Protocol. It can also initiate and manage Windows applications remotely using the Citrix ICA client technology. When Windows programs are run remotely, they actually execute on a Microsoft Terminal Server computer and there is no need for any software components to exist on the client computer.
- **Terminal Applications**
An SSO-capable, scriptable, and auditable VT100/VT220 emulator can use Telnet, FTP and other protocols to communicate with legacy mainframe computer applications. The VIVIDESK terminal emulator supports macro buttons and other customizations that simplify use of older information systems.
- **Internet Applications**
VIVIDESK has a built-in Internet browser that allows Internet-based applications to be displayed and managed as an integral part of the user interface. Internet features, such as file transfer rights, can differ for different user groups. Special display options are available to simplify Internet access with, for example, rapid access to the user's most recently visited sites. The VIVIDESK Internet settings are not affected by local workstation Internet Explorer or Netscape settings and so are present for the user no matter what computer is used to access the user's VIVIDESK desktop.
- **Internet Sessions**
VIVIDESK has a special "Session" mode for Internet applications. This allows many to be open at the same time, on the same plane of the graphical interface. VIVIDESK can then facilitate communication among these multiple Internet sessions.
- **Custom Viewers**
Optional terminal emulator modules can be integrated with the VIVIDESK interface so that users interact with mainframe applications without leaving VIVIDESK. The custom software viewer appears as another "tab" on the VIVIDESK interface.

What Internet technologies are supported?

Many advanced websites make use of Internet plug-in products to facilitate the display of information, images and sound. If an Internet site requires such a plug-in and it is available or installable on the user's computer, then VIVIDESK will work with and use that technology. For example, Adobe Acrobat documents, Microsoft Office internet-format files, Shockwave videos, Streaming audio and video all work seamlessly within VIVIDESK.

What database products are supported?

The VIVIDESK server connects to its supporting database through Microsoft's OLEDB protocol. This is a multi-threaded database interface that is superior to ODBC connectivity for high-performance data transfer.

VIVIDESK servers can be configured to use Microsoft Access 2000 or Access XP databases. Alternately, the server can be set to communicate with SQL databases. Indeed, one server can use different database products (and multiple SQL products) to store information for different VIVIDESK desktops. This hybrid design allows organizations to start small, with the free Access interface, and then migrate to independently licensed SQL products as user demand merits. The migration can be incremental, moving the high-volume desktops first while keeping some prototype desktops in Access format for ease of testing.

What software incompatibilities are known?

One category of software is known to cause potential problems with VIVIDESK, depending upon how that software is configured and installed. VIVIDESK uses the http and https protocols for client to server communication. This is how the product ensures both simplicity of maintenance and compatibility with a wide variety of network configurations. However, some other products are known to interrupt and possibly change the content of http data streams.

Examples include:

- **Virus checking software**
where web monitoring is enabled (the program may run in memory and continually check all Internet traffic for signs of viruses). This may affect the VIVIDESK automatic update program but has not been known to affect actual VIVIDESK client-server communications. Virus checking products can be configured to ignore communications going to or from a particular (VIVIDESK) server, thus bypassing any problems that may yet be discovered with network virus programs. This same problem may pertain if a firewall product is configured to block communications to the VIVIDESK server.
- **Net surveillance**
and policing programs can be set to screen for and disable URLs with certain words in them. These are blunt instruments. If "sex" is disallowed, for example, a call to "http://sexsmith.com" becomes "http://smith.com" and the link fails. VIVIDESK cannot anticipate all the letter combinations that a network administrator might prohibit. It is possible that a combination matching some letters in the VIVIDESK

server address would scramble communications between the VIVIDESK client and its server.

- **Net optimization**
programs sometimes monitor http traffic in order to intercept certain programs and cache them or otherwise redirect them. Proxy servers often do this. This does not affect VIVIDESK but may cause VIVIDESK 's various viewers to fail if they are expecting to handle, for example, Adobe Acrobat files.

What workstation user privileges are needed to install VIVIDESK client software?

The VIVIDESK client installation program uses InstallShield Inc. "package for the web" technology. VIVIDESK installation sites direct the user to download and run an installation program that creates a new directory on the client computer and puts the VIVIDESK Internet plug-in files into that directory. A desktop icon is created.

If a Windows NT or Windows 2000 computer is used with a user profile that prohibits any software installations or any desktop alterations, then the VIVIDESK installation program may not work. In this case, the installation should be performed a user profile that has installation rights. In this case, the desktop icon is available to all user profiles.

VIVIDESK client installation and maintenance is easy to automate with Microsoft SMS or other remote software installation network utilities.

VIVIDESK does not write files to reserved Windows directories, the system directory or any local area network location. It does not require Windows registry access in order to install. For these reasons, it has been found to install seamlessly under most user profiles and requires an administrator to install only on the most restricted network infrastructures.

What is the level of fault tolerance?

Faults can occur at many levels. VIVIDESK has features that improve the fault tolerance of software applications, client workstations and network connections. The most important fault-tolerance functionality, however, stems from the thin-client nature of the VIVIDESK product. No matter what happens on the client computer, VIVIDESK data files and server performance will not be affected. Therefore, users are isolated from problems that may occur on particular workstations. Other types of fault-tolerance help to decrease the cost of ownership and maintenance of Windows workstations:

- **Application failures**
When a user exits VIVIDESK, or is timed out, VIVIDESK closes all open applications and restores the computer workstation to a clean, simple, state. This alone reduces the incidence of software conflicts and failures. Moreover, VIVIDESK cleans up stray program fragments from software applications that may have failed. This decreases the probability that the software will crash the next time it is initiated. Because VIVIDESK offers a number of configuration options for

running software applications, well-tuned VIVIDESK systems often prove more stable than conventional Windows setups.

- **Workstation failures**

VIVIDESK offers a number of strategies for decreasing the likelihood that computer workstations will fail. These include simplified, more secure, boot-up processes, control over task manager, automatic workstation resets and automated workstation upgrade support.

- **Network failures**

VIVIDESK supports a secondary or backup system in the event of a network failure. If the VIVIDESK client cannot connect to its primary server for any reason, attempts to connect to a designated backup server. This happens even if VIVIDESK has already started. As long as the backup server connects to the same SQL database server, the primary and backup connections will work seamlessly without the user being aware of the failure.

VIVIDESK will continue to work even if there is a complete network failure and all contact is lost to both primary and backup servers. The user will periodically receive a message that there appears to be a network failure. This message is generated each time the VIVIDESK client "pings" its server for acknowledgement. The "ping" interval can be set by administrators: as short as every minute or as long as no pings at all. Internet applications running within VIVIDESK may fail if they cannot resolve hypertext links followed by the user.

VIVIDESK can be configured to use a "ping" interval that is so long as to allow VIVIDESK to run completely independently of the Internet after an initial connection is made and a desktop built.

- **Server failures**

Fault tolerance at the level of the server is dependent upon network architecture and network administrator choices. VIVIDESK has been tested in server clusters with load balancing and fail-safe architectures. iW Technologies has experience with mission-critical systems and can advise. At the level of hard drive mirroring or network replication, VIVIDESK simply benefits from whatever backup and network protocols already exist.

Security

What types of security needs are addressed by VIVIDESK?

Although the VIVIDESK system does not, itself, store or transfer sensitive information over the Internet, VIVIDESK Desktops can include links to medical records or other potentially private information repositories. If VIVIDESK facilitates access to such resources in a single-sign-on environment, then it is possible for potentially private information to pass between the VIVIDESK client and its server over a local area network, an Intranet or the Internet (TCP/IP). Accordingly, VIVIDESK has been carefully designed to meet the privacy, confidentiality and security concerns of complex organizations.

If privacy is about an individual's right to control access to information about himself or herself, and confidentiality is about the responsibility of others to protect privacy rights, then security is about the methods by which privacy is declared and confidentiality is enforced.

There are five categories of security procedures in general use:

- **Authentication**
is the ability to reliably identify the source of information, the recipient of information, and any agents that may have viewed or changed the information in transit from source to recipient.
- **Authorization**
is the ability to grant different persons or groups different rights to find, view, change or delete private information.
- **Encryption**
is the ability to prevent recognition and interpretation of the message contents while in transit from source to recipient.
- **Integrity**
is the ability to warrant that information has not been changed or damaged in transit from source to destination.
- **Non-repudiation**
is the ability to record all changes to information so that its prior state can be known and individual changes cannot be revoked without generating a traceable audit trail.

The VIVIDESK system has special features to enable security in each of the above domains. These supplement security methods embedded in most private information resources. VIVIDESK offers extra security at little or no additional administrative burden.

How are users authenticated?

The rules that govern access to VIVIDESK desktops can be configured by system and desktop administrators. Although it is possible to create "kiosk" desktops that open to a custom display without user identification, most VIVIDESK configurations use either VIVIDESK internal user authentication methods or a third-party authentication method.

- **Non-authenticated Desktops**

One or more desktop accounts can be set up for "kiosk" mode. When a user clicks on the VIVIDESK icon, the specified desktop will open to display applications and messages without asking for a user identifier and password. Non-authenticated desktops are appropriate for public-access information. They do not allow email communications, desktop personalization or diary functions, and kiosk desktops do not support storing of personal identifiers and passwords for other applications (Single Sign On).
- **VIVIDESK Authentication**

The most common way to use VIVIDESK is to require that users be correctly identified before access is provided to a specific desktop layout, information resources, and communications tools. Upon clicking on the VIVIDESK icon, the VIVIDESK software establishes a secure connection between its client and server, first sending a request to the server to join a particular project or desktop. The client software obtains the user's logon identifier and password and sends these to the server. If the user is authenticated as described, then a VIVIDESK session is initiated.
- **Windows NT Authentication**

It is also possible to use Microsoft Windows logon protocols to initiate one or more VIVIDESK sessions. If VIVIDESK is used instead of Microsoft Explorer or File Manager as the Windows shell, then different Microsoft Windows profiles can be associated with different VIVIDESK desktop profiles. In this case, logging on to the Windows operating system takes the user directly to the appropriate VIVIDESK desktop. Similarly, when VIVIDESK is run in an application server environment, or via a virtual private network, network sessions can be set to launch specific VIVIDESK desktops upon satisfactory logon to the secured computing environment. The combination of VIVIDESK user management with Windows profiles can greatly simplify the work of network administrators.
- **Third-party Authentication**

Other authentication protocols, programs and user registries can be linked to the VIVIDESK system. Each software product behaves a bit differently, particularly if biometric user identification is used. In general, once the user is correctly identified, then VIVIDESK is opened to a specific user or group desktop. VIVIDESK does not

support X.500 services at this time. However, iW Technologies has experience fashioning connections to different types of general person indexes and can create VIVIDESK add-on modules for validating users against non-VIVIDESK databases, including LDAP directories.

Can password format and longevity rules be enforced?

VIVIDESK administrators can set different levels of password governance for different desktops. The following optional password management rules can be turned on or off:

- **Password Longevity**
Administrators can optionally set an interval after which a user must change a password in order to maintain personal desktop access. The interval starts from the date of first sign-on or last password change.
- **Password Length**
An optional password length can be enforced. This can, for example, force all passwords to be 10 characters or longer.
- **Case Sensitivity**
If this rule is enforced, then passwords must be entered in the correct case in order to be accepted.
- **Alphanumeric Content**
If activated, this rule forces passwords to include both letters and at least one number in order to be accepted.
- **Special Characters**
If activated, this rule forces passwords to include at least one non-letter, non-number special character.

How are users authorized?

User authorization is easily managed with the VIVIDESK administrator, which can be controlled from any workstation where an authorized VIVIDESK administrator is logged on. VIVIDESK administrators set the authentication options for user access, build desktops for each user group, and setup software applications.

The following user rights can be managed with VIVIDESK administrator software:

- User group membership
- User logon identifier, access start date, access end date, audit trail, communications methods and desktop preferences
- Software access, automated macro access, Single-Sign-On privileges
- IP domains where VIVIDESK can be used
- Methods of opening software applications
- Requirement for encrypted communications, inventory access or desktop communications (SSL)
- Electronic mail, diary, inventory, discussion group access
- Home page console properties

Can security be set at the individual user level?

Security can be set at the individual level as well as at the group and application level.

Security features, such as the ability to change passwords, can be applied differently at the user, user group, and workstation levels. When VIVIDESK is run as a Windows shell replacement, it offers advanced security features that can restrict, for example, access to applications that view network resources.

VIVIDESK security is layered on top of Windows security and serves to "tighten up" overall security by simple methods to quickly control which applications – on local machines, on networks, on the Internet and via legacy systems (terminal emulators) – users can access.

Can the system assign users to roles or groups, and assign security at that level?

Users are assigned to a combination of "Group" and "Experience" level.

Groups have attributes that determine what software applications they can access, what messaging system they use, how online tips, reminders, alerts and on-line training will function, whether they can use VIVIDESK document management features, how they access private discussion groups, what level of control they have in a personal diary and whether they can, for example, change their password.

"Beginner", "Intermediate", "Advanced" and "Master" experience levels are defined by administrators. Individual user attributes are automatically tracked and managed by the VIVIDESK system. These are sensitive to the information usage profile that accrues on an individual over time. A "favorites" tab, for example, reflects the applications that a particular user accesses most frequently. Exclusions can also be defined at the level of the individual.

Can administrative roles be delegated to different groups?

Four classes of administrators are supported:

1. **Master administrators** can edit all desktop, user, user group, software and communications attributes,
2. **Communications administrators** can edit the properties of communications tools (messaging, knowledge inventory, etc.) but nothing else.
3. **Applications administrators** can register and update software to be accessed through VIVIDESK desktops.
4. **User administrators** can register new users, decommission existing accounts, and control the specific applications that users and user groups have access to.

The ability to control users, applications and workstations can be assigned to a master administrator. Each function can also be separately assigned to different administrators. Group administrators can be designated and there can be more than one administrator in each class.

Can users change their passwords?

If a VIVIDESK user group and/or location is authorized for password changes, then a security icon appears at the bottom right of the desktop and users can click there to change their main password and up to two application ids and passwords.

Can multiple applications be controlled through a Single Sign On (SSO)?

Yes. VIVIDESK goes beyond most Single Sign On (SSO) products by facilitating controlled access and automated procedures (macros) not only for local area network applications, but also for any application running on the client computer and any Internet, Telnet or Terminal emulator application.

VIVIDESK has many features that facilitate automated logon to multiple software applications. In addition, the iW Technologies team can work with clients and software vendors to produce customized sign-on modules, using VIVIDESK's extensive macro and scripting language, for not only logging on to particular products, but also providing users with a wide range of custom shortcuts and productivity aids. Over 8 years of use, VIVIDESK has been able to control all application software presented for SSO access. Its scripting process so closely emulates actual user behaviors, that the target software application has no way of telling whether VIVIDESK or a user is controlling the software.

SSO is available for local Windows applications (software running on the client computer) remote Windows applications (CITRIX, Advanced Terminal Services Client), TELNET/VT100/VT220 sessions, Internet applications and XML applications. VIVIDESK works particularly well with Windows Terminal Server or Citrix Winframe/Metaframe configurations. The desktop can automate log-on to Terminal Server sessions and can script into remotely run applications from the client-side. Other SSO products do not have this ability.

VIVIDESK can register multiple logon identifiers, passwords and parameters for each user. Application startup and scripting options allow these parameters to be used in a variety of ways to gain access to multiple secure applications. There are unique strategies for working with terminal emulators and Internet applications.

In addition, VIVIDESK has a full-featured macro language that can emulate any combination of keyboard, mouse or special key combinations for controlling any type of software that can be launched from the VIVIDESK interface.

What SSO methods are supported?

VIVIDESK can automate sign-on to software applications by a number of different methods. These include:

- **NT challenge/response:**
VIVIDESK can respond to a standard NT challenge/response over TCP/IP. VIVIDESK passes the user name and password.
- **Internet Form-based authentication:**
For applications that use any type of form-based user logon (POST method), VIVIDESK can be configured to emulate the form and pass the user name, password and up to 6 additional parameters.

- **Remote Desktop Logon:**
VIVIDESK can pass user names, passwords, and domain names directly to Windows Terminal Services computers, and so automate logon to Windows sessions remotely.
- **Telnet challenge/response:**
VIVIDESK can respond to telnet (VT100) user name and password queries, providing user information and so automating logon to legacy applications.
- **Scripted Logons:**
If none of the above methods work, VIVIDESK can send keystrokes, mouse events, clipboard contents and special key combinations to any application that can be displayed in VIVIDESK, irrespective of the software type.

Which hardware and software platforms support SSO functions?

VIVIDESK can automate logons and run automated scripts and macros for the following software types:

- Any legacy system accessible using terminal emulation (VT100, VT220)
- Any 16 or 32-bit Windows software application, either launched from the local workstation or launched over a network (local, wide or virtual private network)
- Any application that can be viewed in an Internet Browser (all Internet Explorer 4.0 or later functions supported)
- Microsoft Windows Advanced Terminal Server client (the client component of advanced terminal server is built-in to VIVIDESK and can be fully controlled and scripted; making VIVIDESK an SSO solution for Microsoft's Remote Desktop Protocol)
- Citrix MetaFrame ICA client for Windows Terminal Services

The VIVIDESK interface for setting up applications is similar to the Windows procedures for setting up software icons, except that administrative work can be done from any Internet-capable workstation and instantly takes effect for an entire network, independent of workstation reboots.

Can VIVIDESK automatically close applications that it has opened?

VIVIDESK can close any software application that it has opened. This includes local Windows applications running on the user's workstation, Windows applications running remotely over the Internet using either Microsoft Remote Desktop Protocol (Terminal Server Client) or Citrix ICA clients, VT100/220 applications and any Internet application. All secondary windows spawned by Internet applications are also closed.

This is an administrator-configurable feature. Desktops can be set to leave applications open, to close applications without requesting permission from the user, or to close applications only after first checking with the workstation user.

Are SSO capabilities limited by firewall, dial-up or web-access constraints?

No. VIVIDESK runs on top of standard networking protocols. It does not host unique network protocols and is able to conduct all its work over firewall port 8080 (80). This port is almost always open because, without it, the Internet cannot be seen at all.

VIVIDESK has been programmed using server-side advanced Internet functions. Simple HTML is sent to the client, with no requirement for complex Javascript or Java applications.

VIVIDESK has been tested in Windows, Novell and other network environments. Firewall and other barriers may limit access to particular domains or types of network traffic in particular environments. VIVIDESK can be configured to use local proxy servers and firewall products.

To what level can an administrator script into an application?

VIVIDESK has multiple methods of achieving SSO functionality. It can automatically respond to a NT user authentication challenge, can automate access to restricted web sites, and can directly interact with Windows Terminal Servers to initiate and control Windows applications running in an Application Service Provider (ASP) environment.

The most versatile SSO method in VIVIDESK, however, is its ability to emulate mouse and keyboard events. This allows VIVIDESK to manage SSO capabilities for a wide range of legacy and current software products because VIVIDESK does not require the software applications to adhere to a SSO protocol.

VIVIDESK supports a variety of "tokens" that can be used to send information from VIVIDESK user databases to applications during their initiation. This means that VIVIDESK can combine information provided dynamically by the user with any information known to VIVIDESK from past user actions or behaviors.

Does VIVIDESK support context management?

The scripting language can access and use information in the Windows clipboard and in 6 custom clipboard channels unique to VIVIDESK. This means that VIVIDESK can use information from one software application (e.g., a patient identifier), to script into another application. This capability is behind VIVIDESK's "context management" capabilities. Scripts can be triggered simply by changing client-side focus from one software application to another. In this way, multiple software applications, based on different core technologies, can be "aware" of and use common information.

Is there complete independence between user and workstation?

Yes. The user "takes" their desktop with them wherever they go in an institution or even an entire region. With VIVIDESK 4.0, their desktop can be further accessed wherever they have Internet access.

Since accounts are managed on a server/client basis, a user can sign on at any workstation in the network and get the same functionality. If a particular software application is not available at a particular location, VIVIDESK will not show its icon at that location.

How are messages encrypted?

VIVIDESK allows basic and advanced communications encryption at a variety of levels:

- **Client-server communications**
A VIVIDESK project can be configured to only allow client-server communications over a secure socket layer (SSL, 128 bit encryption), as long as the VIVIDESK server has a valid security certificate installed, working and maintained.
- **Inventory access**
A VIVIDESK inventory (databook) can be set to allow access to databook contents only via an SSL/https secure connection (128 bit encryption).
- **SSO communications**
User names, passwords and logon parameters used to support single-sign-on to multiple applications are sent from server to client over a secure Internet connection (128bit). In addition, VIVIDESK further encrypts all personal identifiers and passwords using Microsoft cryptography and the unique VIVIDESK session key.
- **Messaging communications**
S-MIME is supported for secure messaging communications.

Although VIVIDESK can be run over a non-SSL internet connection, the option to require SSL for any client-server communications and the use of supplemental supra-128bit unique key encryption methodology ensures an extraordinarily high level of security for all SSO attributes of a VIVIDESK desktop and installation.

How are passwords protected on VIVIDESK servers?

There are multiple levels of protection for passwords and certain other sensitive information stored on VIVIDESK servers:

- **Password access**
Although master and user administrators can reset user passwords, the actual passwords are masked and the administrators cannot see actual password characters. Therefore, setting new passwords or changing existing passwords are the only ways for administrators to be able to know user passwords.
- **Database differentiation**
Information about VIVIDESK user access rights and logon identifiers are kept in a database separate from contact lists, usage logs and user diary contents. This decreases the likelihood of database breaches.
- **Database protection**
The databases used to store VIVIDESK logon identifiers and

passwords are themselves password protected. Before actual database tables can be viewed, the correct SQL or Access user name and password must be entered.

- **Field protection**
The database design is password-protected. Fields that contain passwords are masked such that even administrators cannot read their contents without changing the database design (and so creating a system event).
- **Password encryption**
In addition to encryption that occurs at the level of SSL scrambled communications between client and server, VIVIDESK uses a proprietary algorithm to further encrypt passwords before they are stored in its databases.

How are passwords protected on VIVIDESK clients?

VIVIDESK gathers single sign on information from its server at logon time, using all the protections described above. The logon parameters remain available to the client for the duration of a VIVIDESK session. They are stored in a protected area of computer memory, in an encrypted state. None of this information is stored to hard disk or temporary text files and all information is erased from computer volatile memory when VIVIDESK sessions close.

Does Vividesk support RSA, Entrust and other security products?

VIVIDESK is a thin client that executes on the user's workstation; communicating VIVIDESK-encrypted information to and from the VIVIDESK server over a SSL (128bit) encrypted Internet connection. To the extent that Vividesk is a program on a Windows machine, it can make use of additional security services and capabilities enabled for that workstation. For example, VIVIDESK has been launched following user authentication with biometrics, identity cards, RSA identity fobs or other methods of opening applications or virtual private networks.

Companies like Entrust and RSA produce a number of security products that can be used to serve a wide range of needs. These include:

- User authentication products
- Encryption for secure transmission of different information types
- Approved automated client software installation
- Digital certificate management
- Digital signature adjudication

Entrust Direct, for example, is used to securely access an Internet web server. An Entrust Direct Client component is installed on the client computer and this is used to manage a user authentication dialog. Once the user is authenticated, the local computer Internet browser is launched and connected to the secure web server, with encrypted transmission through the Entrust Server Proxy. This same product can be used to authenticate users and then load a specific VIVIDESK desktop and user profile, in place of the Internet browser. The VIVIDESK desktop is configured to

route all communications through the Entrust Server Proxy (using the /I command line parameter). In this way, the Entrust product is used to fortify authentication to a VIVIDESK environment which then streamlines communications with the secure web server, and also manages other non-secure information services that do not need to go through the Entrust server. Digital signatures and non-repudiation logs are part of Entrust Direct. These complement VIVIDESK functions. **RSA** authentication products can be used in similar ways.

The VIVIDESK system design is very flexible. It can accept third-party "plug-ins" and ActiveX controls and can control these for VIVIDESK purposes. In this way, Entrust or RSA certificate support can be added to the VIVIDESK environment. These more advanced security implementations may require custom configuration by iW Technologies Inc. The company has many years of experience with the security needs of health care and other complex organizations.

What firewall ports are required for encrypted communications?

VIVIDESK alone requires only port 80 to be open. FTP and other protocols are not used. If the VIVIDESK thin-client for accessing Windows programs over the Internet (Citrix or Advanced Terminal Services), then other ports may be required. Use of the remote desktop protocol requires that port 3380 be open.

How is security integrity verified?

How is authentication integrity verified?

Once a successful user authentication has occurred, a "session key" is generated by the VIVIDESK server. This certificate is a digital combination of unique numbers derived from the client workstation unique identifiers (MAC address), server unique identifiers, universal time, and a random number. The key is universally unique and can never be repeated.

A VIVIDESK session, once established, is good for a specific user, workstation, server and desktop. No communications between client and server are allowed without a valid key. The key is also required to gain access to any software applications made available through the VIVIDESK desktop, to make use of single-sign-on features, and to communicate with other users.

The veracity of the session key is checked during a server "ping-back" to the client every 5 minutes. If the client session on the specific hardware has not been maintained, then the session key is deleted and no further communications or information access is allowed between client and server. If software applications launched through VIVIDESK are configured for VIVIDESK authentication, then they cannot be used if a VIVIDESK desktop loses its authentication status. In this way, VIVIDESK differs from most other Internet technologies: the client must re-verify its authentication in order to continue use of information services.

Can time-outs be set to prevent non-authenticated viewing?

VIVIDESK can automatically log off and systematically close all open software applications (launched through VIVIDESK). The time-out period can be set to any number of minutes or it can be disabled and this can be set differently for different workstations and environments

The ability to close both VIVIDESK and any other open software, whether accessed over a LAN, Intranet or Internet and irrespective of the software type (Windows, World Wide Web, Citrix, VT220, etc.) is an exceptionally powerful security feature. The most common security breaches result from users leaving a computer with private applications open on the computer.

How is non-repudiation enforced?

VIVIDESK can be optionally configured to capture detailed information about how software applications are used, right down to the mouse-click and keyboard input level. Auditing can be turned on or off at the level of users and for software applications. With all auditing features enabled, the state of any change to server database contents (user information, applications information, inventory, discussions and notes) is recorded by capturing the state of the record before and after the change. All changes are linked to specific individuals, workstations, desktops, and clusters of software applications.

What audit trails are available?

VIVIDESK has extensive data collection capabilities. These include:

- Records of all online help requests and feedback to administrators.
- Optional logon and logoff queries that can ask different questions of different user groups.
- Full featured, automated, multimedia survey tools that can record users' needs and preferences at baseline and at pre-defined intervals.
- Database logs of where and when any system access occurs.
- Automatic recording to databases, real time, of detailed information about user choices.
- VIVIDESK allows many software programs to be open simultaneously but it records use only of those that have "focus". The records indicate what software was opened, when, where and for how long by whom. Keyboard and mouse events can be captured and recorded, allowing deductions about exact uses of particular software packages.
- Automatic recording of all Internet use, including all Internet sites visited and any keyboard input.
- Logs of all automated workstation updates and any workstation configuration changes.

Can the audit capabilities be configured for different types of users and applications?

Data collection and audit features can be configured for groups, users, applications and workstations.

Usage monitoring, automated surveys and Internet logs can be turned on or off for entire user groups. Within a group, particular individuals can be excluded from data collection.

One or more applications can be excluded from usage monitoring. Within applications, monitoring of keyboard and mouse events can be turned on or off.

Remote Windows Applications

Overview

The VIVIDESK system is optimized for running and managing Windows applications over the Internet. This means that a software application that normally runs on a Windows computer, including any Internet applications, is executed on a server computer but viewed on a distant client computer. The client sees the expected graphical interface to the Windows application and this interface is continually updated over a communication between the client and the server computer. The Windows application runs on a "virtual workstation" on the server computer and the client is able to remotely interact with this virtual computer.

Organizations wishing to support remote windows applications over the Internet often use Citrix MetaFrame or Microsoft Terminal Server. The following questions explore common queries about how these technologies work and how VIVIDESK makes them work better.

How are Citrix Metaframe, Microsoft Terminal Server and VIVIDESK related?

Citrix Metaframe, Microsoft Terminal Server Client and iW Technologies VIVIDESK all permit Microsoft Windows applications to run remotely over the Internet. All three require that Microsoft Windows NT Terminal Server or a Windows 2000 Advanced Server be running on a server computer where the Windows applications are installed and configured.

Citrix Metaframe

Citrix Metaframe can deliver the graphical interface of Windows applications from the Server computer to the Client. To do this, it needs:

- **Server Side**
An Internet server computer running Windows 2000 or Windows NT Terminal Server Edition with Terminal Services licensed and activated.
Citrix Metaframe Server software.

- **Client Side**
A client computer connected to the Internet.
Citrix ICA Client software installed on the client.

Microsoft Remote Desktop Protocol

The Microsoft NT 4 Terminal Server or Windows 2000 Advanced server can also deliver an application remotely from the Server to a remote client computer. This is done over the Internet using the Microsoft Remote Desktop Protocol (RDP) to manage the communication between client and server. RDP needs:

- **Server Side**
An Internet server computer running Windows 2000 or Windows NT Terminal Server Edition with Terminal Services licensed and activated.
- **Client Side**
A client Windows computer connected to the Internet.
Microsoft Terminal Server Client software installed on the client.

VIVIDESK

VIVIDESK is a "container" technology that can hold and control either Citrix clients or Microsoft RDP clients within its shell. The RDP client is built-in to VIVIDESK and so VIVIDESK can run Windows programs over the Internet without need for installation of any additional client software. To run Windows programs remotely, VIVIDESK needs:

- **Server Side**
An Internet server computer running Windows 2000 or Windows NT Terminal Server Edition with Terminal Services licensed and activated.
- **Client Side**
A client Windows computer connected to the Internet.
VIVIDESK client installed. The client is the same software as used for all other VIVIDESK functions.

Can VIVIDESK be used as a thin-Client for Citrix and Microsoft Servers?

Yes. Given a Citrix Metaframe server or a Windows Terminal Server, VIVIDESK can serve as a thin client in one or more of the following ways:

- **ICA (Citrix) Client Manager for Citrix Server**
The ICA client is used to establish a connection with a Citrix server computer and to run Windows applications over the Internet. The ICA client software works within VIVIDESK. VIVIDESK can run multiple ICA sessions, facilitate communication among those sessions, economize on the number of user licenses required, and automate logons and shortcuts within multiple ICA client sessions.
- **Advanced Terminal Server Client Manager for Terminal Server**
The Advanced Terminal Server Client uses Microsoft's Remote Desktop Protocol (RDP) to establish a connection with a Windows

Terminal Server computer and to run Windows applications over the Internet. VIVIDESK has an embedded RDP viewer. VIVIDESK can run multiple RDP sessions, facilitate communication among those sessions, economize on the number of user licenses required, and automate logons and shortcuts within multiple RDP client sessions. ICA and RDP sessions can be run simultaneously and can share information via the VIVIDESK container.

- **RDP Client Manager for Citrix Server**

The VIVIDESK RDP client is compatible with the Citrix server. This client software has some potential advantages over the ICA client for Windows workstations. VIVIDESK allows either the RDP client or the ICA client, or both, to be used in conjunction with a Citrix Metaframe Server.

VIVIDESK does not need Citrix software to be present on either client or server computers. If Citrix software is installed server-side, VIVIDESK can take advantage of its features, either for application management or by using its ICA client.

How do Citrix, RDP and VIVIDESK technologies differ?

The Citrix ICA client and Microsoft remote access ActiveX control (Advanced Terminal Server Client, RDP) perform the same functions, with some differences in functionality. The VIVIDESK remote access system includes the Microsoft RDP functionality, adds additional features, and can combine both Citrix and RDP clients in one user interface. To our knowledge, the VIVIDESK version of RDP is the only RDP methodology currently available that supports multi-session, single-sign-on, scriptable remote Windows application control.

Feature (note)	ICA	RDP	VIVIDESK
Client			
Windows 95, 98, NT, 2000, XP compatible	✓	✓	✓
Macintosh, Unix compatible	✓		
Run 16-bit Windows applications over Internet	✓	✓	✓
Run DOS applications over Internet	✓	✓	✓
Run 32-bit Windows applications over Internet	✓	✓	✓
Server Management			
Create user accounts and rights using NT or Win2000 user management		✓	✓
Create user accounts and rights using custom user management software	✓		✓
Set up applications server-side by associating with user profiles	✓	✓	✓
Server-side logon to NT user profile and automated start of Windows application	✓	✓	✓

Feature (note)	ICA	RDP	VIVIDESK
Client-side automated logon using userid and password from a general person index, either Windows user registry, VIVIDESK registry or third party registry (1)			✓
Ability			
Workstation Integration			
Non-dithered full 256 color palette replication, without color distortions irrespective of differences between client and server color palette.		✓	✓
Seamless mapping to client default printer.		✓	✓
Ability to run multiple Windows client sessions, without loss of clipboard, printer or drive mapping functionality. (2)			✓
Ability to run scriptable ICA and RDP interfaces in same graphical interface. (2)			✓
Automatic client-window resizing to match client screen resolution. (3)			✓
Infinite client-window size options. (3)			✓
Full Windows clipboard support. (4)		✓	✓
Local drive mapping so that client drives accessible to server applications	✓	✓	✓
Audio System Beeps		✓	✓
Stereo Windows Audio	✓		
Application Integration			
Support for 6 additional clipboard channels for moving information between Windows applications, remotely managed, even if those applications are on multiple servers. (4)			✓
Simultaneous sign on to multiple terminal server computers, all run on the same client with common printer and clipboard control. (4)			✓
Ability to move data between multiple Citrix and RDP sessions. (2)			✓
Connect directly to applications rather than entire desktop	✓	✓	✓
Connect directly to multiple separate applications on one terminal server, using one license.			✓
Single user can access multiple terminal servers and terminal server profiles using different usernames and passwords; full SSO capability. (6)			✓
Logon scripts. (6)			✓

Feature (note)	ICA	RDP	VIVIDESK
Macro scripts. (6)			✓
Applications can be set to time-out after a period of inactivity.	✓	✓	✓
Security			
SSL (https) encryption of userids and passwords; up to 128-bit cryptography	✓	✓	✓
Additional client-server encryption of terminal server logon parameters, active even if https is not used. (5)			✓
Optional substitution of advanced RSA or Entrust cryptography for protection of logon parameters. (5)			✓
Automated logon to secured applications after Windows NT challenge. (6)			✓
Licensing			
Terminal Server Application Mode licensing required from Microsoft.	✓	✓	✓
Additional Server license required from Citrix		✓	
Seat licensing: one client access license used for each workstation/user combination. (7)	✓	✓	
Connector licensing: any number of users and workstations up to a certain number of simultaneous connections. (8)		✓	✓
User licensing: multiple users can access one or more terminal servers in same server cluster, coming in from any number of workstations, and use up only one CAL. (8)			✓
Administrators can change all user and application rights and passwords without using up Terminal Server licenses.			✓
Automated client-side time-out irrespective of terminal server time-out settings. (9)			✓
Other Features			
Record of terminal server sessions; number, start time, end time.	✓	✓	✓
Record of activity within terminal server sessions; mouse events, keyboard events, amount of time session has focus. (10)			✓
Record of information exchanged between remote access applications. (10)			✓
Can run on terminal server thin clients; 100% application service provider compatible.	✓	✓	✓
Can run Windows applications on the client side as well, with full scripting, integration, macro, and usage monitoring.			✓

Feature (note)	ICA	RDP	VIVIDESK
Can substitute for the Microsoft Windows shell and so provide complete workstation "lockdown" with thin-client technology.			✓
Ability to distribute remote desktop requests to different servers, conditional upon network location of the client. (11)			✓
Users can store information from remote desktop sessions in a personal diary that remains part of the user's desktop.			✓

Note	Explanation
------	-------------

1. The Microsoft RDP ActiveX control (for Internet Explorer) does not allow user names and passwords to be sent to the server by the client shell program (Internet Explorer or some other browser). The RDP control built in to VIVIDESK provides VIVIDESK with full access to all features, including those not enabled for usual Internet use. Consequently, VIVIDESK can send commands via the RDP protocol. These special communications can include information for automatically logging on to a particular terminal server profile, loading software and controlling such things as screen resolution, clipboard and printer functions.
2. Because the RDP client is built-in to VIVIDESK, multiple remote Windows applications can be run along side one-another, each protected from the other's memory space but each also able to share information and run under a single graphical interface. To do this using the Microsoft ActiveX control or the Citrix ICA control requires multiple instances of Internet Explorer running, without the ability for these to share session variables.
3. When RDP is used via the Microsoft ActiveX control in Internet Explorer or via the Advanced Terminal Server Client, a screen resolution must be selected from a limited set of pre-defined resolutions. VIVIDESK is able to set the screen resolution to exactly the amount of space available on the client computer, thus optimizing use of the graphical interface. The same applies to the Citrix ICA client, which forces a specific screen resolution even if this means wasted space on the client computer. For this reason, remotely managed Windows applications in VIVIDESK look like they are fully integrated into the user interface. They "maximize" to take up all the available screen area.
4. The RDP client, as contained in VIVIDESK, supports multi-level clipboards and the ability for the server and client clipboard to share information seamlessly. VIVIDESK additionally provides 6 independent clipboard channels that facilitate a total of 7 communications ports between multiple remote-control Windows sessions, even on different servers.
5. VIVIDESK adds proprietary userid and password encryption to protection offered by the https Internet protocol.
6. VIVIDESK has the ability to send keystrokes, mouse events, clipboard contents and other information to open ICA (Citrix) or RDP (Windows) sessions. This scripting capability can be used to automate complex logon procedures and to provide users with macros that perform common functions across multiple different types of windows applications running remotely.
7. Microsoft Terminal Server client access licenses (CALs) are required for both Citrix and Terminal Server remote application delivery models. One CAL is used for each user/workstation combination. This means that if a single user accesses the Terminal Server from three different computers, three CALs are used.
8. The optional Microsoft Terminal Server Internet Connector license allows 200 simultaneous remote access sessions for a server or server farm covered by the license. In this case, a license is consumed for each workstation, user and

Note	Explanation
------	-------------

- | | |
|-----|--|
| | connection but the licenses are returned to the pool after the user logs off. A CAL (above) is permanently associated with the workstation that activated it. The Internet Connector License, however, only covers a single terminal server access user account. The VIVIDESK system optimizes use of the more economical Internet Connector License because it allows many different users, with different privileges, to be using the same license. This fact, when combined with the fact that VIVIDESK setups do not require Citrix licensing, represents a major cost saving. |
| 9. | VIVIDESK's ability to easily assign different automatic sign-off times to different users and user groups, makes it possible to gain all the security advantages of inactivity signoffs without having to set up unique application and user profiles on the server for every possible time-out scenario. This represents a major savings in administrative time. |
| 10. | The Terminal Server management software is capable of keeping detailed logs of what happens on the terminal server computer. The VIVIDESK system adds to this information by having the ability to also record what happens on the client computer. This greatly extends audit and usage monitoring capabilities. |
| 11. | VIVIDESK can associate many different methods of accessing a remote desktop server with a single user. Which server to use can be decided based on the client computer location or other rules. This feature can be used to increase overall reliability of the system. |
| 12. | A Macintosh-compatible RDP client is expected from Microsoft. As soon as this technology is available, it will be added to VIVIDESK. |

How do Citrix, RDP and VIVIDESK server management methods differ?

The Citrix server-side software includes advanced user and application management tools. These can simplify "load balancing" whereby a Windows application is available on multiple terminal servers and the client can be directed to the one with the least load at the point that it makes a request of a server in a Citrix neighborhood. This same load balancing functionality can be replicated on a cluster of Windows 2000 servers but requires more know-how of the network administrator. On the other hand, network administrators usually require special training and certification to become adept at managing Citrix server clusters.

Both Citrix and Microsoft RDP configurations use Windows NT user profiles and rights for managing which clients are able to access which resources within a network domain.

VIVIDESK sits on top of either Citrix or Microsoft RDP server-side user and application management. VIVIDESK user and application management tools are easier to use and administer. A common approach is to cut down on the number of NT profiles server side (as few as one or two) and allow VIVIDESK to manage differential user rights within those profiles.

Vividesk is a simple, comprehensive and elegant approach to managing access to all applications for an enterprise, whether or not they are Citrix, RDP or other applications.

How do Citrix, RDP and VIVIDESK handle licensing and user fees?

Cost comparisons between remote Windows delivery strategies should be based on common feature sets. However, the VIVIDESK system adds many features not available with either Citrix or RDP stand-alone configurations. Therefore, the relevant cost comparison is between Citrix and RDP approaches, with VIVIDESK cost additions or subtractions added to either model.

Scenario #1: 50 users, 50 personal computers, 5 applications

Assumptions

- One user-one computer (cannot access from home and work, for example)
- One terminal server handling at most 10 simultaneous sessions

Citrix licensing

- Windows 2000 Advanced Server license (common)
Windows Terminal Server license (included in above, common to Citrix and RDP)
- Citrix Metaframe license (\$6000 US MSRP with 15 users)
- Windows Terminal Server Client Access Licenses:
50 x \$120 CDN
- Citrix User Licenses
50 x \$200 US
- Total = ~\$50,000 over cost of server, network equipment, Windows 2000 and Terminal Server Licenses

RDP licensing

- Windows 2000/NT Server license (common)
Windows Terminal Server license (included in above)
- Windows Terminal Server Client Access Licenses
50 x \$120 CDN
- Total = ~\$6,000 CDN

RDP plus VIVIDESK

- The combination of RDP and VIVIDESK offers all the functionality of Citrix since, in this scenario, the number of users and applications is small and these are very easy to set up with a few WindowsNT profiles. VIVIDESK adds all the functionality of distributed desktop portal technology (with management and control over local windows applications and internet applications as well) for an additional \$100 per user (enterprise purchase), adding \$5,000 CDN to the total license cost while reducing the cost of server maintenance and management.

- VIVIDESK can also be combined with Citrix to provide greater client-side integration, scripting, and software management capabilities.

Scenario #2: 500 users, 1000 personal computers, 100 applications

Assumptions

- Users are now allowed to access the terminal server applications from both a work computer and a home or off-site computer
- Four terminal servers handling at most 50 simultaneous terminal server sessions each
- This profile more closely matches a complex institution

Citrix licensing

- Windows 2000 Advanced Server license (common) * 4
Windows Terminal Server license (included in above, common to Citrix and RDP) * 4
- Citrix Metaframe license (\$6000 US MSRP with 15 users)
- Windows Terminal Server Client Access Licenses:
500 x \$120 CDN
- Citrix User Licenses
500 x \$200 US
- Total => \$150,000 over cost of server, network equipment, Windows 2000 and Terminal Server Licenses

RDP licensing

- Windows 2000/NT Server license (common)
Windows Terminal Server license (included in above)
- Windows Terminal Server Internet Connector License (200 simultaneous users distributed across 4 servers)
\$10,000 US
- Total => \$10,000 over cost of servers, network equipment, server licenses

RDP plus VIVIDESK

- The combination of RDP Internet Connector License and VIVIDESK uniquely offers all the functionality of the 500-user Citrix model but, because of its ability to use the connector license, VIVIDESK substantially reduces the costs. At \$100 per user (enterprise purchase), adding \$50,000 CDN gives a total license cost of approximately \$60,000 without compromising functionality. In addition, because VIVIDESK can do client-side load balancing, the need for a complex server configuration is reduced.

VIVIDESK Economies

Adding VIVIDESK to any of the above scenarios can improve performance and reduce total cost of ownership, even if initial total license costs appear greater. Remote Windows application strategies are most vulnerable to the capacity of the terminal server computer(s). Each remote application causes a "virtual" personal computer to be created in the server memory. Each new user and each new application consumes additional server resources. In this way, as few as 10 simultaneous remote users (and 10 virtual personal computers in server memory) can significantly slow performance. For this reason, Citrix and Microsoft provide methods to balance the load of virtual computers across multiple servers. VIVIDESK can help systems administrators get more out of limited server resources in the following ways:

- Multiple RDP sessions running from a single VIVIDESK session use but one virtual machine.
- VIVIDESK is usually configured to open a single software application on the server, minimizing the resources consumed by such sessions because other Windows components do not have to be loaded.
- VIVIDESK allows many users, with many different VIVIDESK rights profiles to share a single Terminal Server Internet Connector license. This can greatly reduce the number of licenses required to sustain a user group.
- VIVIDESK automatically logs users off terminal sessions as soon as they are no longer needed. This conserves valuable server resources.
- VIVIDESK can distribute terminal server sessions among multiple servers without going through server-side load balancing software. This can significantly reduce the cost of setup and maintenance of a terminal server cluster.

Usage Monitoring

How is data collected and what is captured?

Basic information about a VIVIDESK session is always captured. In this way, it is known how many times different users log on to particular VIVIDESK desktops. Basic VIVIDESK session information is stored in the VIVIDESK data server databases.

Further data collection can be turned on or off user by user. The VIVIDESK Administrator software is used to set the data collection properties for each VIVIDESK account. Although the default is "ON" when creating new user accounts, any account can be designated for no data collection. In this case, no information is ever recorded to the desktop database for this account. This feature is useful in conventional and market research. For example, it may be desirable to not record desktop usage by system administrators. If user data collection is turned on, it is still possible to independently prevent data collection about specific software applications.

The VIVIDESK Administrator software is used to set the data collection properties for each registered software application and information resource. If application data collection is turned on, it is still possible to independently prevent capture of keyboard activity. This feature is useful if, for example, there is a need for information about how often an application is used but for privacy reasons it is not appropriate to record what information is entered to that application.

What types of usage data are tracked?

VIVIDESK always captures basic information about VIVIDESK sessions. A session starts with a validated user logon and ends when a user signs off, is timed out, or if the VIVIDESK desktop fails to check in with the VIVIDESK server. Automatic session data includes the desktop requested, user unique identifier, security key, user computer address, logon time, and whether the session ended normally or possibly had a problem.

VIVIDESK optionally captures much more detailed information about exactly how software applications are used within VIVIDESK. Whether this information is stored or not depends upon whether data collection is turned on for a particular user account (if off, no data is captured for that user) and application (if off, user data may be collected but not the particular application data). Optional usage data

includes information about how long the user interacted with each software application, what associated websites were visited and what sequence of mouse clicks and keyboard input was used.

VIVIDESK can record information about who logs on, when, where and for how long. It also can capture much more detailed information about how the VIVIDESK desktop and its software applications are used.

In what format is VIVIDESK usage data recorded?

The VIVIDESK server computers record all VIVIDESK usage data. No usage information, or any record of VIVIDESK activity for that matter, is recorded on the local computer workstation.

Depending on the VIVIDESK server configuration, usage data may be stored in Microsoft Access Tables, Microsoft SQL Server databases, or other SQL database products. Either way, the database content can be exported to a wide range of other formats.

Can audit results be displayed online?

VIVIDESK includes a "DataView" for system administrators. This allows immediate graphical display of system usage data. For example, one could request information about the total duration of use of particular software products by selected user groups during a defined time interval. The results are displayed in various chart formats and can be printed.

The same DataView tool can be used to extract data subsets from the audit records. Extracted data is in Access table format and can be analyzed using standard statistical tools.

Communications

Can global messages be sent out?

Yes. This is one of VIVIDESK 's greatest strengths.

VIVIDESK has two embedded messaging systems and it can implement third party messaging systems. VIVIDESK can also associate pop-up messages and summaries with software applications.

The VIVIDESK interface has a "messaging" section to the left of the screen. This can be used to send one or more messages to all or part of a VIVIDESK user group. The messages can change at every log-on and they can be sent out in "bulletin" mode when one message overrides all others and gets distributed to everyone immediately (for VIVIDESK networks and Intranets). Similarly, alerts can be set for only specific user groups. VIVIDESK includes a user-friendly message writing tool that administrators can use to quickly author tips, or use the clipboard to copy them from other software. Tips are formatted in HTML and so can have a wide range of graphical features. They can be linked to help files, Internet resources or to any software package registered in VIVIDESK. Because the tips are entered and edited online, there is no need to upload or modify HTML files on a web server.

What is the best way to add messages and applications?

Applications and abstracts can be thought of as two sides of the same coin. An application is any resource (Internet/CD-ROM/Windows) that is intended for use by project participants. Abstracts are short descriptions of (or guides on how to use) applications. Abstracts are directly associated to applications -- when opened, an application will appear in the right hand panel of the VIVIDESK Desktop, and its abstract will appear in the left hand panel.

Messages (also called Tips) are generally guides for using VIVIDESK features or other topics of interest for a particular group of participants. These (like abstracts) appear in the left-hand panel, however, they are not directly associated with any applications.

A master list of messages and applications/abstracts are kept in **Library**. This is where any new additions should be added using the VIVIDESK TIP template for

tips /messages and the VIVIDESK APPLICATION template for applications/abstracts.

Messages and applications can be nested from Library into whatever VIVIDESK Inventory Databook you are working with. Once messages and applications have been added to a Databook it is easy to add them to the associated VIVIDESK desktop using the VIVIDESK admin Message Builder (messages/tips) and the VIVIDESK Application Abstract Builder (applications/abstracts). These builders will guide the process by providing a list of folders or items that contain VIVIDESK TIP or VIVIDESK APPLICATION templates.

Support

What level of support comes with the VIVIDESK?

iW Technologies offers a number of options for support in addition to its complete online manuals, Internet support files, mailing lists and electronic bulletin boards.

Pilot Projects, Custom Solutions

iW Technologies prefers to have a direct relationship with the client during any demonstration project or customization of iW Technologies products.

Implementation

iW Technologies provides direct user support during installation and initial implementation of VIVIDESK systems. The goal is to teach support staff so that they have full control over user, application, workstation and data management. At the conclusion of training (usual requirement is 1/2 day), iW Technologies can provide customized auto-installation, backup and data management routines.

In most cases, institutions prefer to be trained to provide Tier I support through their own help desk.

Tier II support can be taught to the client, obtained from iW Technologies, or outsourced to one of iW Technologies' VAR or Systems Integration partners.

Tier III support (any malfunction of VIVIDESK software) is provided directly by iW Technologies.

Electronic mail and telephone help lines are serviced together with Internet electronic mail lists and newsgroup support that is connected to other VIVIDESK installation centers.

Regional Roll Out

iW Technologies works with Value Added Resellers and with Systems Integration Support companies for large VIVIDESK installations.