THINMANAGER
A ROCKWELL AUTOMATION TECHNOLOGY

LEARNING PAPERS:
ThinManager Benefits vs. a Standard Microsoft Unmanaged Solution

This document is intended to outline and where possible quantify some of the benefits of an RDS (Microsoft Remote Desktop Services, formally known as Terminal Services) ThinManager managed solution as compared to a standard typical unmanaged architecture with Microsoft based clients (thin/embedded or fat) in a similar configuration. It does not attempt to differentiate between a non-RDS (client/server) type of architecture and a terminal server based solution; it is assumed that the reader is aware already of these benefits.

One of the major benefits of a ThinManager solution that should be kept in mind while reading this document, is that a ThinManager thin client is essentially what is termed a 'zero client'. A zero client has no operating system whatsoever, while a thin client used in a traditional Microsoft RDS solution usually has an embedded operating system located on an internal drive (usually a solid state 'flash' drive). In general, in this document, the term thin client is used to mean both types of devices, unless there is a specific reason not to.

Note that within this document no attempt has been made to numerically quantify the savings involved, since many of these will be different and specific according to your locale.

This document concentrates on aspects of ThinManager delivering savings and benefits in these areas:

- Reliability
- Control & Flexibility
- Security
- Energy Costs
- Maintenance Costs

Reliability

Reliability is critical in an automation system. Reliability equates to Availability, and the lack of Availability is Downtime. ThinManager works to ensure that even when something bad happens (and something bad always happens eventually), that instances of unscheduled downtime are minimized or eliminated.

Server Failure

A Server crash is usually the Plant Engineer or Supervisor's worse nightmare. When a server dies, all of the applications on that server go down at once. Because of this, in an RDS environment it is usual that at least two servers are available, in a Primary/Standby configuration. An alternate is to use a high availability solution such as Stratus fault tolerant hardware, but often this is used mainly on a database system and not running the main automation system (or if it is, there are often multiple such systems).

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If a server crashes therefore, in a standard Microsoft architecture, the operator notices a loss of connectivity to his terminal. He needs to (typically manually) start another session to a known Secondary server, login and start the application he needs. This can cause problems if the operator needs to have eyes on the process for the duration that this restart occurs, often a batch may be compromised causing scrap, rework or even an e-stop.

In a ThinManager solution, the ThinManager system is generally configured to understand the Primary and Secondary server architecture (in fact, ThinManager can define as many standby servers as necessary). Should a Primary fail, the thin client running the ThinManager core software automatically detects this and switches to an available Secondary. If desired, ThinManager can be configured to maintain a secondary session, which means that should this failure occur, the replacement session can be switched into the operator's view, typically within one second. Therefore in a ThinManager architecture, although the server connection is lost, the operator may not even be aware of this.

Depending on the particular process, this ThinManager capability can deliver significant payback the first time it is used. Often, a server failure demands immediate, 24/7 attention from a systems engineer, consequently causing a costly and inconvenient site visit on a weekend and/or during the night. With the ability of ThinManager to use multiple servers, the systems engineer may only know that a failure has occurred when he checks his mail on Monday morning and sees ThinManager's notification.

It is also of course possible to implement failover functionality in user code within an automation application. This of course adds complexity and maintenance requirements and is also only possible if the user has access to the internal code of the application. With the ThinManager approach, failover can be implemented for any application, without having to modify or even touch the internal operation of the software.

Ethernet Failure

It is possible using complex switch configuration and network administration, to ensure in any system that should a network path to a server fail, a secondary path is used. However in a standard system this often takes a degree of advanced network design knowledge – not all plant engineers are fortunate to be of this standard.

In a ThinManager solution, providing the thin client has two network ports (many industrial grade units do), it is possible to configure this routing simply within ThinManager. The only network design needed by the plant engineer is to ensure that cable routings are separate and that different switches are used for these routings.

The savings to the user with this aspect of ThinManager come from the reduced complexity in network design and maintenance.

Failure of an Operator Terminal

The MTBF of a typical industrial grade thin client has been shown by many ThinManager customers to be in excess of 10 years. As a guideline, we say that a lifetime before failure of 7-10 years can be reasonably expected. Commercial grade thin clients, while generally more robust than PCs, will typically have a shorter lifetime.

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In general, there will not be a huge differential between a ThinManager architecture and a non ThinManager enabled solution, however there is usually more complexity and failure points in an embedded PC solution (the type found in Microsoft architectures), with aspects such as Flash devices and the overall OS complexity.

Control and Flexibility

This is an area where ThinManager has a lot of value over the pure Microsoft architecture. The standard tools available in a Microsoft system are centered around server management and configuration. There are minimal tools for monitoring and administrating clients. All of these configuration aspects require Administrator access to the server. Conversely, a ThinManager solution is rich in management capabilities, and these are available in a simple, single user interface, enabling configuration of a complete system from Clients to Servers, from Users to Applications.

Remote Client Status and Control

A Microsoft based system has limited capabilities for managing and viewing the status of a remote client session. It has no control at all over the physical client, nor the applications that are needed to be accessed by the operator of that device.

With a ThinManager system, the system engineer or supervisor has complete control over a terminal. The terminal can be configured, rebooted and reset from the ThinManager interface. The applications that the operator is using can be managed, and the terminal can be set to operate on a known schedule. Within the ThinManager interface, a manager can see at a glance the status of all terminals in the plant network.

For an SI or engineer/manager at a geographically dispersed site, physically having to be present at a terminal for a test, or to reset it, can involve a significant time out of the office just to get to the terminal. With ThinManager all of this can be done from a central interface.

Remote Client Shadow

The ability to Shadow a terminal is not present in a standard Microsoft RDS solution. With a ThinManager implementation, a systems architect has the ability to place on any terminal screen, anywhere on the network, an identical ('shadow') copy of any other screens in the system.

This is particularly useful in control rooms, where multiple displays can show each screen in the plant, and on large equipment (such as steel mills, food processing ovens etc.) where a single process can be duplicated at multiple locations on that equipment.

This not only saves costs for extensive KVM cabling, it can reduce the number of application software licenses needed at locations where such cabling is not even possible, since a shadow copy does not require a software license from the application software vendor.

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Versatile and Multiple Application Support

With ThinManager, only the application that is required to be present at the terminal is actually delivered to the terminal. With a remote desktop session, behind the application that is running is a complete user desktop session, including Start menu etc., which could be exposed should the application somehow crash. ThinManager also can lock out hardware key sequences, such as Ctrl-Alt-Del that can prevent the application being interrupted or not visible when a pop up menu is displayed by the OS.

It is possible, using RDS and thin client technology, for an operator thin client terminal to display multiple application sessions on one device. However, this involves manually configuring and using entirely separate remote desktop sessions (or implementing and then configuring the complicated Microsoft RemoteApp functions of Microsoft Windows Server 2008/2012).

With ThinManager, multiple applications can be available at a single thin client terminal using the MultiSession capability of ThinManager. These sessions can be coming from different terminal servers if required and selection of these is simple – either from a drop down menu, from a configurable keyboard sequence, or from a tiled display. A tiled display is unique to ThinManager. It is the ability to show all sessions on a terminal in a real time mosaic and have the operator click inside the session window to make it full screen.

Server Load Balancing

In any RDS environment of medium or large size, the ability to balance a load of application processes across a number of servers is valuable. In an Microsoft RDS scenario, the recommended way to do this is by using Server Clustering.

With ThinManager, this is done in a very versatile manner and without the need for a clustered system. ThinManager can balance the load over multiple terminal servers and dynamically start a new session on the system with the least load. A customer can have multiple servers and easily add more. Certain applications can be balanced across a server 'farm', while others are locked to the systems they need.

Clustered Servers are complex and require significant administration overhead. With ThinManager, only standard server systems are required, and these can be easily configured with a single checkbox.

MultiMonitor

ThinManager's capabilities with MultiMonitor systems exceed that of standard Microsoft configurations by a large margin. ThinManager can manage up to five screens on a thin client, can span applications across displays and allow them to be moved from one screen to another. Some displays can be spanned, others single screens, on the same terminal. Each screen can also be tiled.

On a ThinManager MultiMonitor terminal, different touchscreens from different vendors can also be configured.

To achieve what ThinManager can provide as a standard function, a typical Microsoft based system would need to implement an architecture with multiple thin clients at the same operator station.

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ThinManager can also perform MultiMonitor aggregating. We call it simply shared keyboard and mouse. If a large presentation space, such as a video wall, is needed, ThinManager can take say 4 thin clients, each with 5 screens and control them from a single point as if they are one.

With Microsoft you can now span displays, but ThinManager can enable up to 25 monitors to be used at a single workspace, with a single keyboard and mouse, displaying multiple applications in a far more flexible manner.

Video

Implementing Video outside of an RDP based application is not possible with a standard Microsoft implementation.

Using cheap IP cameras, ThinManager can put video overlays on screens without needing any application modification. It can also manage multiple video pictures on a single screen, rotate pictures from multiple cameras, etc.

Typically the greatest area of savings with this capability is in cabling (no special cabling is required, even wireless can be used), and the ability to monitor a remote site anywhere on the plant.

Mobility

There is a great deal of emphasis today on mobility. To implement tablet or wireless workstations on a typical Microsoft system, you would need a compatible device, running a Windows operating system and remote desktop applications. Most of these devices are based on embedded Windows systems, or sometimes a full Windows client OS (Windows 7 or Windows 8).

ThinManager WinTMC gives you the option of the above architecture, but in addition offers two dedicated tablet applications to make this solution far more flexible.

ITMC is a fully featured mobile thin client emulator for an IOS device, such as an iPad, and also shortly for Android based tablets. This application provides the capabilities of a ThinManager thin client, including shadowing and multisession.

The ThinManager Mobile management application is downloadable free from the Apple App Store. It's available for an iPad, iPhone or iPod Touch, which on a smaller device is still useful for remote configuration and status.

Security

Today, Security is a vital aspect of an automation system and very much in the fore of the mindshare of any plant manager. ThinManager has several benefits above those provided in a typical Microsoft architecture.

Apart from liability and safety aspects of security, a systems breach adds significant costs to the operational side of a plant. Three examples in recent times:

- An African steel facility suffering three days of disruption because of an uploaded virus;

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- A UK Dairy plant suffering downtime and multiple days of disruption because of malicious access by an ex-employee;
- The Saudi Arabian ARAMCO Company suffering the contamination of over 30,000 PC systems and involving a three month cleanup operation.

User Security

In addition to the security (authentication) capabilities of Microsoft (such as Active Directory), ThinManager can provide more granular access control. Using our Relevance User Services (formerly TermSecure) feature, applications can be presented to users at terminals only if those users have the correct access rights. Security on a user basis can also be used to have a supervisors applications follow him around the network, so he can have automatic access to his desktop and applications from any thin client just by authenticating. Once he logs out, then the applications are no longer available to the user of that terminal.

With ThinManager, the terminal operator need not even be aware of the underlying system accounts needed to operate application software and is therefore further isolated from accessing corporate systems.

Hardware Based Security

Thin clients typically have their USB ports disconnected and only available for local use. There is no way to access the server to upload a virus or download intellectual property. Also, because there are no hard drives, CDs or floppies on a thin client, there's no way external software can be introduced.

With Microsoft RDS you have a client system at your disposal with an OS which can technically be compromised.

Locally connected hardware devices (such as RFID readers for RSA-level authentication) are also supported by ThinManager.

Intellectual Property

In traditional client/server industrial applications, it is often the case that the applications being run are present on the PC drive, and should the PC be stolen, this represents a risk of IP loss. In thin client situations, this is less likely, but in the case of an embedded system it is possible that local storage is used for algorithms, data, etc.

In a ThinManager system, this is not the case. If the thin client is powered off, it becomes a 'brick' with no locally stored data.

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Energy Costs

Power Utilization

The more complex a device is the more power it will draw, and consequently the operational expense will rise. A typical thin client will draw about 18W, compared to a fully operational PC system often in excess of 100W.

ThinManager thin clients are the thinnest of thin and have no power requirements at all when powered off (i.e. they have no Standby mode).

Cooling

Similarly, as more power is consumed, more power needs to be input into any conditioning systems. Especially in a clean environment, such as a control room, this can be significant.

Maintenance Costs

When considering investment in a ThinManager and thin client architecture, many institutions are often primarily concerned with the capital costs of the RDS based architecture in comparison with a traditional solution. In practice, a green field thin client solution will have a very similar capital cost to implement as a traditional architecture.

The main return on an investment in implementing a thin client solution is actually in the operational costs, where the day to day operation demands availability and continuity of operation, rapid resolution of maintenance problems and lean principles in all aspects of daily operation.

This section details some of the advantages of a ThinManager based thin client solution over a traditional Microsoft RDS architecture.

Overall Management

In a non-ThinManager environment, configuration of Servers is generally done using Microsoft System Centre (in more modern Server operating systems). This is a central place for server configuration. With Microsoft, you can manage the user sessions, but there is no client management for the thin client devices.

With ThinManager you have one interface to configure all aspects—Terminals, Servers and Security. ThinManager enables configuration of servers, terminals and applications running on those terminals from a central utility, and when configured the same utility can monitor the real time status of any terminal and server in the network. You can also configure groups of Terminals with similar properties and easily therefore configure a large number of terminals at once by simply crediting a new

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terminal instance. With ThinManager, it is possible to configure a large number of terminals in a single day, without often the need to visit the plant locations where the terminals are installed.

Once configured, you can deploy the client configurations remotely to any terminal on the network, a powerful function. Management of the terminal space can be done without the intervention of the IT department, which can reduce interdepartmental costs (more if IT is outsourced). Total cost of ownership has been independently shown to be up to 50% lower with a terminal server and thin client architecture, and of course there are green aspects to this because of the lower energy consumption and cooling requirements.

Server Failure

When a server fails in an unmanaged environment, each application running on that server and being displayed on a network terminal either freezes or simply disappears from view. Manual operator intervention (meaning that the operator often is privy to network authentication accounts and passwords) is required to establish connection to the applications needed on secondary servers. In the case of a process where operator interaction is essential, unscheduled downtime may occur.

In a ThinManager environment, server failure is handled automatically by the thin clients and ThinManager. Automatic failover to a backup server is performed without the need for any operator interaction, and multiple, differing servers, can be selected by the ThinManager software intelligently based on the utilization requirements of the systems. If an operator critical application is being used, ThinManager can ensure that the failover occurs in less than a second, obviating the need to stop the process.

System Upgrades – Servers

A server upgrade, or even just applying a patch, is usually a significant event in a manufacturing plant, which requires planning and scheduling considerations from plant management through to systems and operations personnel. In a unmanaged scenario, the sequence to perform an upgrade involves planning to manually move the applications running on that machine to another server, shutting down any sessions which are still running, performing the server upgrade and testing, then finally placing the server back online. After that, the client applications are usually reinstated. In an unmanaged scenario, this activity must be repeated for every server that needs an upgrade.

In a ThinManager managed environment, the upgrade is handled in a slightly different manner. The server to be upgraded is placed out of service within ThinManager. This is a one-click operation. At this time, all applications are automatically switched to secondary systems, and the operators usually continue undisturbed. After the upgrade is completed on the server, it is placed back in service and continues as a part of the network. This process is repeated on other servers in the system until all are upgraded. There is no manual client interaction needed.

System Upgrades – Clients

A non-'zero client' is essentially a lightweight PC device with an embedded operating system. As such, it is probable that at some time this system will need to be updated, perhaps to have a client OS patch applied, some memory upgrade etc. If this occurs,

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then the client device must usually be taken out of service and a standby device used.

With ThinManager using zero client technology, all updates if needed to the device firmware are handled within ThinManager. No downtime is necessary apart from a reboot, which can be done at leisure (a terminal reboot does not cause any downtime on the actual server applications being displayed on the terminal).

Terminal Configuration

Terminal configuration, adding applications that may be required, reconfiguring login information and such, is a manual process on the standard unmanaged thin client.

Within a ThinManager system, all configurations are done offline to the running clients using the ThinManager administrative interface. Configuration may be done on individual terminals or on hundreds of terminals in a group at once. The client then receives the new configuration when it next powers on or on demand.

Adding a new terminal to a network can also be done without the terminal being connected. A configuration can be defined and then the terminal integrated into the ThinManager managed system when it powers on for the first time and is booted by ThinManager.

Terminal Replacement

This last scenario considers what is needed in the (unlikely) event of a terminal failing.

In an unmanaged system, should a terminal fail, a new terminal will be needed. The old device is removed, the new one connected, and then manually configured appropriate to the applications that need to be displayed on the terminal. This inevitably takes time to do.

In a ThinManager managed solution, if a terminal fails, it is a simple matter of plugging in a new one, booting it and answering a one-time ThinManager question to relink to the currently disconnected session. This can take less than five minutes.

Summary

This document reviews the major areas of value differential between an unmanaged Microsoft RDS thin client implementation and a similar architecture using ThinManager managed clients.

The actual ROI benefits of each of these capabilities are left to the individual reader to determine. However, there is assistance if needed.

Several documents (available at www.thinmanager.com) are available to discuss these benefits in more detail.

In addition, a Return on Investment application is available for download at www.thinmanager.com/roi.