Best practices for designing and implementing FactoryTalk View Site Edition Distributed Applications
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Introduction

This document is intended as a supplement the standard documentation that is provided with the FactoryTalk View Site Edition v5.10 software. It is designed to make system developers aware of the fundamental best-practice guidelines for designing and implementing a FactoryTalk View Site Edition (“View SE”) system.

What’s New

In addition to the applicable View SE “legacy” content, this document contains new information that is specific to the View SE V5.10 (CPR9 SR2) release. Sections with new information are clearly marked with “(New in CPR9 SR2!)” or “(Improved in CPR9 SR2!)”.

Much of the general networking content was moved because a separate document titled Ethernet Design Considerations for Control System Networks exists (found in the Rockwell Automation Literature Library - ENET-S0001A-EN-E) This companion document provides fundamental best-practice guidelines for designing the Ethernet infrastructure for Supervisory Controls and Data Acquisition (SCADA) systems using Rockwell Automation hardware and software products.

Additionally, much of the information regarding Hardware and Operating System Requirements, Workgroup vs. Domains, and Component Installation Best Practices has been removed from this document with instead references to the FactoryTalk Help or FactoryTalk View SE Release Notes.


Using this Document

The purpose of this document is not to repeat information included elsewhere. In some cases, this document may discuss topics in detail; in other cases, a section may simply refer to another document or website where the same topic is thoroughly discussed or is more routinely updated.

The structure of this document is as follows:
• General information on distributed applications (e.g., workgroup vs. domain questions)
• Overview, installation and activation of the FactoryTalk View components
• Best Practice Guidelines on Communications (e.g., RSLinx Entperise vs. RSLinx Classic)
• General information on security
• Best Practice Guidelines using FactoryTalk View features
• Overall Considerations and Useful Tools
• Quick reference links

Specific information is sorted by relevance to a specific component or capability, so it is possible to find some overlap.
Document Naming Conventions/Abbreviations

Frequently throughout this document, the user will be directed to more information in the form of Answer IDs, or AIDs. These are technical papers created by Rockwell Automation and posted on the Rockwell Automation Knowledgebase, accessible here: http://www.rockwellautomation.com/knowledgebase

Prerequisite Reading: FactoryTalk View Site Edition Documentation

The following View SE related documents are installed with the product and should be considered prerequisite reading for this document. These documents may also be found in the Rockwell Automation Literature Library (Software > Performance & Visibility) and, when possible, are linked directly below.

<table>
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<tr>
<th>Literature Library</th>
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<tr>
<td>FactoryTalk View Site Edition Installation Guide</td>
<td>VIEWSE-IN003I-EN-P FTViewSEInstallENU.pdf</td>
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<td>RSLinx Enterprise Getting Results Guide (June 2009)</td>
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When using View Studio or the SE Administration console, links to most of these documents are located on the Help menu:

![View Studio Help Menu](image)

**Note:** In a default View SE installation, the .PDF files launched by these links can also be found in C:\Program Files\Common Files\Rockwell\Help.
Prerequisite Reading: FactoryTalk Help

Another source for reference documentation is FactoryTalk Help which can be accessed from the Windows Start Menu on any machine installed with the FactoryTalk Services Platform. Start > Programs > Rockwell Software > FactoryTalk Tools > FactoryTalk Help

Prerequisite Reading: FactoryTalk View SE Release Notes

New features in this release can be found in the “What’s new in FactoryTalk View Site Edition v5.10” section of the Release Notes. The Release Notes are available from the View SE installation menu:
After View SE is installed, a link to the Release Notes is also located on the Help menu of FactoryTalk View Studio (and the FactoryTalk View Administration console):

![FactoryTalk View Studio - Site Edition (Network)](image)

Release notes can also be found in [Answer ID 56362 - Factory Talk View / RSView ME and SE Release Notes](Answer ID 56362 - Factory Talk View / RSView ME and SE Release Notes).

### Additional Related Documentation

The following related documents, available from the Rockwell Automation Literature Library, provide additional information:

- **Logix5000 Controllers Design Considerations** (Publication 1756-RM094C-EN-P)
- **Ethernet/IP Performance** (Publication ENET-AP001D-EN-P )
- **Plant PAx Process Control System** (Publication PROCES-RM001D-EN-P )


Regarding network design, as mentioned above:

**Ethernet Design Considerations for Control System Networks** (Publication ENET-SO001A-EN-E)

Check also the Rockwell/Cisco [Reference Architecture](Reference Architecture) site. Reference Architectures are built on technology and manufacturing standards common between IT and manufacturing. The information here includes Design Guides for Network Infrastructure, Design and Implementation (DIG), and Ethernet I/P Media planning and installation.

### Revision History

- Revision 1.0 (12/2007): Initial release for v5.00 (CPR9)
- Revision 1.1 (02/2010): Release for v5.10 (CPR9 SR2)
- Revision 1.1a (03/2010): Corrected System Limits, p. 18
- Revision 1.1b (11/2010): Removed reference to unavailable Knowledgebase Answer, p. 35
What’s New in FactoryTalk View Site Edition (Network) v5.10 (CPR9 SR2)?
As mentioned previously, a complete list of what’s new can be found in the Release Notes.

A summary of the new features has also been included here:

- Application Documenter and HMI Server Backup and Restore utilities are now installed with the product.
- New faceplates for the Advanced Process Control instructions introduced in RSLogix 5000 v17 release.
- Trend object enhanced to support FactoryTalk Historian Site Edition.

New features of View SE 5.1 are discussed in Answer ID 64333 - FactoryTalk View Site Edition Version 5.1 New Features

Known Issues  (New in CPR9 SR2!)
Known issues in this release can be found in the “Known anomalies” section of the View SE Release Notes or also within the FactoryTalk Help.
Recommended Platform Requirements

The hardware and operating system used with FactoryTalk View SE depends on the demands the application will place on the system. The greater the demand, the more powerful a system needed. For large or complex applications computers should be used with faster CPUs and more RAM. For applications that demand high availability and the ability to serve many clients, a Windows Server operating system should be used. In smaller, local applications, a Windows Workstation operating system might be just fine.

Hardware and Operating System Requirements

Keep in mind that as a general rule, there will be improved performance in any application with a faster CPU and additional RAM over the published minimum or even recommended amounts. In addition, there should always be sufficient disk space to provide virtual memory that is at least twice the size of the physical RAM.

See the platform requirements in the FactoryTalk View SE Installation Guide – Chapter 2 for specific information on hardware and software requirements. This information is also in the “Before Installing FactoryTalk View SE” section of the View SE Release Notes.

Information on system requirements may also be found in Answer ID 44183 - System Requirements for FactoryTalk View

For the latest information about the software platforms supported by View SE, refer to Answer ID 42682 - Rockwell Automation Software Product Compatibility Matrix in the Rockwell Automation Knowledgebase.
Note:

- Some Microsoft operating system service packs and hot fixes are not compatible with FactoryTalk View Site Edition. To find out if there are any problems with a particular Microsoft update, refer to Answer ID 20450 - FactoryTalk View SE Operating System and Service Pack compatibility matrix in the Rockwell Automation Knowledgebase.
- FactoryTalk View SE is only tested on operating systems installed from original Microsoft media.

Important!
For all FactoryTalk View Site Edition (Network) Applications using Windows 2000 Professional SP4

- Anyone running a network (distributed) application on Windows 2000 Professional with Service Pack 4 or Windows Server 2003 Standard Edition with Service Pack 1 should install the Microsoft Hotfix for the DCOM 108 (also known as RPC_E_DISCONNECTED) errors. Go to Answer ID 37039 in the Rockwell Automation Knowledgebase for details and a link to the Microsoft patch.


Installing a new Operating System on computers

Be sure to always install the computer vendor supported or recommended OS if upgrading or modifying the system. In some cases, there are not proper hardware drivers for a particular hardware/software combination. Using unsupported operating systems or drivers can cause the computer to be unstable. Obviously, if the OS is unstable, it is too much to ask for any applications running on it to be stable. Please be aware that computer manufacturers can make modifications to Operating Systems which may impact the installation or performance of our software products. It is recommended to use full versions of the intended operating system on all workstations.

Server OS vs. Workstation OS

- It is highly recommended that the FactoryTalk Directory, HMI and Live Data Servers be installed on a server OS. Windows XP and 2000 Pro are workstation operating systems (they have a 10 connection limit). Multiple connections are established to each ‘server’ by every View SE Client (including View SE Studio).
- As a general rule, servers and clients should be in the same Windows OS ‘vintage’. For example, Windows 2000 clients should not be used with Windows 2003 (or Windows XP) ‘servers’. The combination of Windows XP SP2 ‘servers’ and Windows 2000 Professional SP4 clients has been problematic with both Rockwell Software and third-party products. Refer to Answer ID 32427 - FactoryTalk View SE clients get no data when Windows XP SP2 hosts an OPC Live Data Server.
- View SE server side components are not supported on clustered servers. However, when using Windows 2003 Server and Terminal Services, the SE Client component can be installed on 2003 Terminal Servers that are using Network Load Balancing (NLB).
**Internet Information Server (IIS)**

Internet Information Server (IIS) is a required component only on any computer hosting an HMI Server. It is not required (and in fact not recommended) for any other View SE computers (Live Data Servers, clients, etc). It is recommended that IIS be installed with only the minimum required components as described in Chapter 2 of the FactoryTalk View SE Installation Guide. For more information on using IIS with FactoryTalk View SE, refer to Answer ID 39618 - FactoryTalk Internals: FactoryTalk View Site Edition IIS Handbook.

**Windows Error Reporting**

There is an error reporting feature included with Windows XP, Windows Server 2003, Windows Server 2008 Standard and Windows Vista with Service Pack 1 that can be used to report computer and program errors to Microsoft. Typically, there is no benefit to using this feature in a Rockwell Software environment, and disabling it is recommended. For more information refer to Answer ID 42651- Instructions for disabling the Windows Error Reporting feature.

**Virtual Environments**

Rockwell Automation announced limited support for virtualization in production environments using VMware. Refer to Answer ID 30209 - Rockwell Software in Virtual Environments for more information.

**Workgroup vs. Domain**

FactoryTalk systems require a Windows network and rely on a number of Windows elements, including Internet Information Services (IIS). All FactoryTalk systems components must reside in either a Windows workgroup or a Windows domain.

**Workgroup**

Decentralized Administration

Advantages:

- No Domain Controller (Windows Server OS) to purchase.
- One less computer in network to maintain.
- Recommended only for small View SE applications where user accounts don’t change often.

Workgroup Rules:

- The system can consist of no more than 10 FactoryTalk computers.
- All computers participating in an application must be members of the same Windows workgroup.
- All users participating in the workgroup must be members of the Administrators group.
- Create the same set of user accounts and passwords on every computer in a FactoryTalk View SE application. For details refer to Help provided with Windows.
Domain
Centralized Administration

Advantages:
- Centralized Administration
- One place to manage Users, Groups and Security
- Automate IP addresses with Dynamic Host Configuration Protocol (DHCP), and Name Resolution and with Domain Name Service (DNS) and Windows Internet Name Service (WINS).

Domain Rules:
- For applications consisting of more than 10 computers, a domain controller is required.
- Rockwell Software components (including FactoryTalk Service Platform components) should not be installed on domain controllers.

Information to help make the decision between a Windows Workgroup and a Windows Domain can be found in the FactoryTalk Help, under the headings Installing FactoryTalk Software / Guidelines for Windows Workgroups and Domains.

An abbreviated version of the help file can be found in AID 66173 - FactoryTalk Considerations for Windows Workgroups and Domains.

Additionally, the View SE Release Notes contains information on how to set up the Windows domain or workgroup under the heading “Before installing FactoryTalk View SE”.

Domain Best Practices

Extensive information is available from Microsoft and is beyond the scope of this document, however there are some key points that users of a View SE system in a Windows Domain should understand:

- View SE supports the following domains:
  - Windows 2000 Server Active Directory (in Native or Mixed mode)
  - Windows Server 2003 Active Directory (in any functional level)
  - Windows Server 2008 Active Directory (in any functional level)

  **Note:** Windows 2000 Active Directory (AD) domains introduced the concept of a “forest.” A forest can consist of a single “domain tree”, or multiple domain trees. A domain tree can consist of a single domain (a.k.a. the “parent” domain) or multiple domains (a.k.a. the “child” domains). A single forest, single tree, single domain configuration is recommended. In Windows Server 2008 Active Directory, both domains and forests have individual functional levels. The default functional levels are recommended:
    - Domain: Windows Server 2008 mixed
    - Forest: Windows Server 2008

  To determine the Window 2000 domain mode, launch Active Directory "Domains and Trusts" (Start > Programs > Administrative Tools), right-click the domain and select "Properties". To determine the Window 2003 or Windows 2008 functional levels, the identical procedure is used.

- It is recommended to select internal Microsoft Active Directory domain names carefully. An internal Microsoft Active Directory domain name should not be confused with an Internet (external) domain name, and while they can be the same name, typically they are not. Consult the local IT department or the Microsoft Best Practice Active Directory Deployment for more information.

- Domain Controller Redundancy:
  - Windows NT4: In addition to the Primary Domain Controller (PDC), it is recommended to implement at least one backup Domain Controller (BDC) to provide high availability.
  - Windows 2000 Server & Windows Server 2003 Active Directory: it is recommended to implement at least 2 domain controllers, where both are configured with the Global Catalog (GC) role to provide high availability. By default, the GC role is only on the first domain controller in the forest, but the GC role on other domain controllers can be added from the Active Directory Sites and Services console. Simply expand Sites > site name > Servers > server name, right-click NTDS Settings, and select Properties. The Global Catalog check box is on the General tab. **Note:** There are still a number of single instance domain controller roles that can result in a single point of failure. These 5 Flexible Single Master Operations (FSMO) roles are:
    1. PDC Emulator (one per domain)
    2. Infrastructure master (one per domain)
    3. Relative ID (RID) master (one per domain)
    4. Schema master (one per forest)
    5. Domain naming master (one per forest)
It is recommended to configure time synchronization throughout a domain. For more information, refer to the section entitled "Time Synchronization" later in this document.

Prior to deploying a View SE system, both new and existing active directory domains should have their operation verified using Microsoft’s Domain Controller Diagnostics (\Dcdiag.exe) utility. This utility is included with the Windows Support Tools located on the Operating System CD and also available via download from Microsoft.

Rockwell Software does not support our software on computers configured as domain controllers. The following information comes from a Microsoft TechNet article posted at http://www.microsoft.com/technet/prodtechnol/windows2000serv/maintain/security/secdefs.mspx.

The key sentence in this TechNote is "In general, Microsoft does not recommend running applications on computers configured as domain controllers, and certainly not applications that require more than Authenticated User privileges in order to run successfully." Installation of any application software on a domain controller can have adverse affects on the network and is the responsibility of the user to accept the risk.

Windows Support Tools

Microsoft provides numerous diagnostic tools for Domain Controllers, Active Directory and networking in general that must be installed after the operating system. To install the tools, browse the operating system CD (Windows XP and Server 2003) to \Support\Tools\ and run SupTools.Msi. To get an overview of the tools available, click Start > Programs > Windows Support Tools > Support Tools Help. For more information, see Answer ID 30956 - Microsoft Network Diagnostic Tools for Ethernet.
Component Installation Best Practices

A typical View SE deployment consists of a FactoryTalk Directory Server, an HMI Server(s), a FT Live Data Server(s) and Client(s). In the case of a Site Edition (Local) application, all of these components are located on a single machine. In the case of a Site Edition (Network) application, these components may be distributed across multiple host computers. The many potential choices result in a large number of potential architectures.

A comprehensive and graphical explanation of where FactoryTalk components should be installed can be found in the FactoryTalk Help under the heading “Installing FactoryTalk software”.

Other topics covered by this section of the FactoryTalk Help:

- upgrading from previous versions
- installing software updates
- FactoryTalk Activations
- deploying a FactoryTalk system.
Software Installation

The View SE installation is largely unchanged, however in order to simplify the installation, it is recommended to follow the **FactoryTalk View Installation Assistant**, which can be found using the ‘Open Installation Instructions’ link from the View SE installation menu:

![FactoryTalk View Installation Assistant](image)

**Note:** Establish the system’s computer names prior to installing FactoryTalk Service Platform and View SE. Changing computer names after the installation of the software is not recommended.

**Default File Locations for FactoryTalk View SE**

**Core program files:** C:\Program Files\Rockwell Software\RSView Enterprise

**Help files and additional documentation:** C:\Program Files\Common Files\Rockwell\Help

**Default File Locations for FactoryTalk View SE Distributed Applications**

The locations of the product files vary slightly depending on the operating system used:

**Windows 2000:**

- **Network FactoryTalk Directory File:**
  C:\Documents and Settings\All Users\Application Data\Rockwell\RNAServer\Global\*.RnaD

- **Application Files:**
  C:\Documents and Settings\All Users\Documents\RSView Enterprise\SE\HMI Projects\

**Windows Server 2003:**

- **Network FactoryTalk Directory File:**
  C:\Documents and Settings\All Users\Application Data\Rockwell\RNAServer\Global\*.RnaD

- **Application Files:**
  C:\Documents and Settings\All Users\Shared Documents\RSView Enterprise\SE\HMI Projects\
Windows Server 2008 Standard:

Network FactoryTalk Directory File:
C:\ProgramData\Rockwell\RNA\Server\Global\*.RnaD

Application Files:
C:\Users\Public\Documents\RSView Enterprise\SE\HMI Projects

Windows XP:

Network FactoryTalk Directory File:
C:\Documents and Settings\All Users\Application Data\Rockwell\RNA\Server\Global\*.RnaD

Application Files:
C:\Documents and Settings\All Users\Documents\RSView Enterprise\SE\HMI Projects

Windows Vista:

Network FactoryTalk Directory File:
C:\ProgramData\Rockwell\RNA\Server\Global\*.RnaD

Application Files:
C:\Users\Public\Documents\RSView Enterprise\SE\HMI Projects

Help Files and additional documentation: C:\Program Files\Common Files\Rockwell\Help

System Limits

To set up a FactoryTalk View Site Edition HMI system successfully, observe these limits taken from the FactoryTalk View SE Installation Guide – Chapter 2, under the “Limits for application server host computers” heading:

- The maximum number of FactoryTalk View Studio clients that can have simultaneous access to a FactoryTalk View Site Edition application is 5.
- The maximum number of HMI servers supported in an application is 10.
- Each redundant server definition is a pair - primary and secondary. Therefore, each redundant server definition consumes 2 of the 10 available servers.
- The maximum number of FactoryTalk View SE Clients that can have simultaneous access to a FactoryTalk View Site Edition application is 50.
- In non-redundant scenarios, the maximum number of HMI servers that can be hosted on a single computer is 2*.
- In redundant scenarios, the maximum number of HMI servers that can be hosted on a single computer is 1.

* The FactoryTalk View SE Installation Guide states that running more than one HMI server on a single computer is not recommended, but the maximum number of HMI servers supported on a single computer in a non-redundant scenario is two.
Activation

An electronic product activation tool, FactoryTalk® Activation™, is supported along with EvRSI activation. EvRSI activation will be replaced by FactoryTalk Activation in a future release. If EvRSI activation are used, please contact the local Rockwell Automation Sales office or Technical Support for information on migrating EvRSI activations to FactoryTalk Activation.

EvRSI Activation

When using the EvRSI activation mechanism with View SE, there are generally 3 configuration options:

1. on local hard drive
   • this is the recommended configuration, for more information refer to the Activation On-line Help (Programs > Rockwell Software > Utilities > Activation Help).
   • HMI Servers must use this configuration.
2. on a network drive
   • often used for SE Client activations, so that they do not need to be placed on each individual client computer
   • for more information, refer to the Activation On-line Help and Answer ID 2777 - Network Installation Of EvRSI.SYS Activations
3. on the FactoryTalk Directory (a.k.a. “Floating”)
   • for more information, refer to the Activation On-line Help.

FactoryTalk Activation

FactoryTalk Activation also provides a choice of configuration options:

1. node-locked (includes local and mobile)
2. concurrent (includes floating and borrowed)

In systems using HMI clients that may not be dedicated, it might be desirable to use a single, centralized FactoryTalk Activation server to serve client licenses.

For more information regarding FactoryTalk Activation, refer to:

- FactoryTalk View SE Installation Guide - Chapter 4 - Activating FactoryTalk View software
- the FactoryTalk Activation On-line Help
- Answer ID 38510 - What are FactoryTalk Activation System Requirements v3.02 (CPR 9 SR2)?
- Answer ID 35251 - FactoryTalk Activation Frequently Asked Questions
- Answer ID 44623 - What VIDEOS are available on FactoryTalk Activations?
- Answer ID 35717 - How would I be able to check the connection between the FactoryTalk Activation Server and Client

When deploying a FactoryTalk Activation Server, refer to:

- Answer ID 35376 - FactoryTalk Activation Server User Management
- Answer ID 41573 - FactoryTalk Activation End User Options File to Include/Exclude Borrowing Activations
- Answer ID 35708 - How to support FactoryTalk Activations in a LAN/WAN Environment
FactoryTalk Alarms & Events

Before FactoryTalk Alarms and Events, FactoryTalk View SE supported only HMI tag alarm monitoring. To maintain compatibility with existing applications, View SE still supports this type of alarm monitoring. However, FactoryTalk Alarms & Events now allows multiple FactoryTalk products to participate in a common, consistent view of alarms and events throughout a FactoryTalk system. For more information, refer to:

- FactoryTalk Alarm and Events System Configuration Guide
- Answer ID 44177 - FactoryTalk Alarms & Events - Special Considerations for the initial release
- Answer ID 44479 - How To Configure a Device-Based Alarm Server in CPR9
- Answer ID 44175 - How to configure a Tag-based Alarm Server in CPR9

To migrate existing HMI alarms to FactoryTalk Tag-based alarms, a conversion utility can be found in Answer ID 45583 - Tool: Converting RSViewSE HMI Alarms to FactoryTalk View SE A&E Tag-Based Alarms.

Redundancy (HMI & Live Data Server)

Redundancy requirements are unique to each application. The ideal redundant solution involves having at least two instances of everything – hardware, software, networks, and so on. In practice, this is seldom feasible or even necessary. View SE redundancy allows creation of duplicate server information that can be used if a server fails. The desired outcome is to maximize system availability. Software redundancy is not the equivalent of PLC style hot backup.

Keep in mind that FactoryTalk View SE Enterprise Redundancy is typically used for:

- Computer hardware failure
- Software failure on one HMI/Live Data Server computer
- Power failure on one HMI/Live Data Server computer

Before setting up redundancy, plan:

- Which components in the system require redundancy?
- What software components on PC’s require backup systems?
- The network layout of the components within the system.
- CPU processing load that is expected for each computer.

Software redundancy can be configured for:

- HMI Server
- Live Data Server

Note: Alarm & Events Server redundancy is not available in CPR9 SR2.

If using (2) computers, one server should be designated as the “Primary” with the responsibility of the Primary HMI Server and Primary Live Data Server. The second computer designated as “Secondary” with the responsibility of the Secondary HMI Server and Secondary Live Data Server. A “load sharing”
configuration where one server is the primary in one role and the secondary in the other role is not recommended.

The FactoryTalk Directory server does not require configuration for redundancy. The FactoryTalk Directory information is cached on each computer that is participating in a distributed application. If the FactoryTalk Directory server computer is disconnected from the network or fails, each client and server in the application can continue to access the graphics (from HMI Servers) and tags (from Live Data Servers) in the application as long as the computer had previously accessed the FactoryTalk Directory server. However, since the FactoryTalk Directory is required to edit the application, it is recommended to place the FactoryTalk Directory on a PC with high availability. Though placement on the Primary HMI Server is supported since in theory that is a highly available server, it is strongly recommended that the FactoryTalk Directory be located apart from the redundant servers on a separate machine.

Additional Information

- FactoryTalk View SE User’s Guide - Chapter 13 - Setting up FactoryTalk system availability
- Answer ID 40891 - FactoryTalk View SE 5.0 (CPR9) Server Redundancy Guidelines
- Answer ID 44624 – FactoryTalk View SE 5.0 (CPR9) - Determining any Server's Current Status and State in a Display Client.

System Modification

General System Modification Procedure (Redundant & Non-Redundant)

- Some tag information is loaded into RAM when the View SE services start. Therefore, some tag database modifications may require:
  - Server restart/reboot
  - Client session restart
  - Client screen refresh
  In order for the change(s) to take affect. The integration team should evaluate what modifications may be needed and have a procedure in place to allow for them once a project has been commissioned.

System Modification Procedure on Redundant Servers

- Simple Display modifications which do not require new Tag creation can be copied and pasted from one server to the other without halting the servers. The change will then take effect the next time the screen is displayed.
- Simple Macro modifications which do not require new Tag creation can be copied and pasted from one server to the other without halting the servers. The change will then take effect the next time the macro is executed.
- Simple modifications to Data Log Models, Derived Tag Files, and Event Files which do not require Tag creation can be copied and pasted from one server to the other without halting the servers. Prior to changing these files they should be stopped first, by issuing the following commands:
  - DatalogOff <Data Log Model Name>
• **EventOff** `<Event file Name>`
  • **DerivedOff** `<Derived Tag Name>`

  * Once modifications have been completed and saved, then the files need to be restarted by issuing the following commands:
    • **DatalogOn** `<Data Log Model Name>`
    • **EventOn** `<Event file Name>`
    • **DerivedOn** `<Derived Tag Name>`

  * Type the command without the `< >` around the object name.
  * HMI Tag Deletion requires halting the server and transferring the project to the other server. All references to tags must first be removed. This includes all reference used in Display Animation, VB code, Event File, Derived Tag File, and Data Log Model.
  * Any Alarm Tag changes which require the use of the “Accept Button” in the Tag Database editor requires halting the server and transferring the project to the other server.

### Communications

RSLinx Classic (RSLC) and RSLinx Enterprise (RSLE) can both communicate with SLC/PLC/CLX controllers. However, RSLE is the preferred method of communications for View SE unless one of the following features of RSLC is needed.

- OPC/DDE Server to non-FactoryTalk applications (RSLE can provide OPC, but requires FactoryTalk Gateway)
- Alias Topic Functionality
- Unsolicited Messaging
- Complex communication routing. Protocol changing (ex. Ethernet to DH+)
- Offline browsing of PLC/SLC RSLogix files

RSLC and RSLE can also co-exist on the same computer at the same time (refer to Appendix C of the RSLE Getting Results Guide for more information).

When designing an application, do not duplicate references to Live Data Servers (RSLC, RSLE and 3rd Party OPC Servers) in the application. Tags from a single Live Data Server may be referenced from any HMI project in any area of the application; therefore, it is recommended to place only one Live Data Server per Area.
If a particular physical area in the plant has more than one Live Data Server (RSLinx for Rockwell controllers and Kepware for a 3rd party controller, for example), create logical “sub-Areas” to separate the two as illustrated below:

For more information, refer to Answer ID 29663 - FactoryTalk View SE Area Best Practices.

When planning communications:
- Gather information about the types of controllers or devices in the plant, and the software that is available for communicating with them.
- Determine how the programmable controllers on the network will communicate with the application. This will help plan the number of Live Data Servers needed in the application.
- Determine how the application will access data in the controllers or devices. In most instances, the values in controllers or devices can be directly referenced without needing to create an HMI tag.

For certain special instances however, the need to set up an HMI tag database may exist. HMI tags provide extended capabilities, such as:
- Triggering alarms when tag values cross a specified threshold.
- Scaling or offsetting a value before sending it to a programmable controller or device.
- Security

Live Data Servers allows clients to access information in programmable controllers, devices and other Live Data Servers that comply with the OPC-DA 2.0 specification.
Live Data:  TCP/IP or DCOM
FactoryTalk System Policy allows the Live Data protocol to be selected. This policy setting affects communications between client and server services and between the FactoryTalk directory and servers on the network. This setting is considered a "default" because if the FactoryTalk Live Data service detects that some components on the network are not compatible with the selected policy setting, it overrides the policy and uses whichever setting is most likely to ensure uninterrupted communications. For example, for third-party servers and RSLinx Classic, FactoryTalk Live Data will not attempt a TCP/IP connection and will always use DCOM.

The FactoryTalk Services Platform installation process evaluates the services and components on the network and sets the communication protocol appropriately. For example, if an earlier version of the FactoryTalk platform is upgraded to FactoryTalk Services Platform 2.10 (CPR 9) or later, the communications default is automatically set to DCOM. If the FactoryTalk Services Platform 2.10 or later is installed for the first time on a computer, the communications default is automatically set to TCP/IP. Typically, it is not necessary or advisable to change the default setting. Refer to the FactoryTalk Help for more information.

RSLinx Enterprise Predefined Items
RSLinx Enterprise Predefined Items are internal counters and strings that are made available as data items (tags) for diagnostic purposes. These items differ from regular data items in that they access internal information contained in RSLinx Enterprise. The referenced technote includes two View SE graphics containing RSLinx Enterprise diagnostics counters. One graphic contains counters that can be used with ControlLogix family controllers and the other one contains counters that can be used with PLC-5, SLC, and MicroLogix family of controllers. These graphics will import into a View ME or SE project. Refer to Answer ID 30148 - Using RSLinx Enterprise Diagnostic Counters - Predefined items

How many tags can RSLinx poll in a given amount of time?
There is no straightforward answer to this question. There are many factors involved, some of which are:

- **The computer hardware that the Live Data Server (RSLinx Classic or Enterprise) is running on.** The more memory and the faster the processor, the better.
- **Additional CPU loading from other software running on the same computer.** Even if the multiple software products are compatible to run on the same PC, performance may be affected if they must fight for PC resources. Use Task Manager or perfmon to monitor for resource hogs. Those software packages may need to be moved to another PC to improve the overall performance.
- **Other software packages communicating to the controllers from the same or different PC.** Batch or Recipe packages doing uploads or downloads.
- **The network the data will be polled over (Ethernet, ControlNet, DH+, DH-485, Serial, Dial-up, etc.).** There are physical and practical limits to how much data a network can transmit. Additional research may be needed for the specific design.
- **The number of controllers the Live Data Server will need to communicate with.** Just as in conversations, it is easier and more productive for you to call one person for a lot of information than it would be for you to call fifty people for only a little bit of information each. That is one reason why a data concentrator controller may be beneficial or needed.
• **The type of controllers.** Some of the newer Logix brand controllers have been developed with networking optimization in mind and therefore perform better then others.

• **How the controller program is written.** Are the tags or data points optimized in the controller to be in consecutive blocks or are they scattered randomly throughout the controller? Are they in arrays?

• **How the controller is configured.** In the Logix family of controllers, the communication time slice can be tuned. This setting only applies to the continuous task in a project. The background task uses the remaining time after running the periodic tasks and any motion task. This determines how much time is used for communication processing. Be sure not to increase this value too much so that it does not impact on the scan time of the controllers program. Refer to Answer ID 25915 - Setting the Overhead Time Slice or Increasing Processor Bandwidth for Comms.

### Data Server Load

The loading on a data server is a combination of three variables:

- the number of controllers from which data must be collected
- the number of tags being requested from each of those controllers (and the frequency)
- the number of View SE clients (and the refresh rates of their displays)

As a data server becomes more taxed, tag/screen updates will appear slow. There may also be errors in the FactoryTalk Diagnostic Viewer. While there is no single rule to specify the performance boundary of a data server, there are best practices that can be followed.

With RSLinx Classic, the recommended maximum values for each of these variables are:

1. No more than 10 Logix controllers per data server (via Ethernet)
2. No more than 20 PLC/SLC controllers per data server (via Ethernet)
3. No more than 10,000 active (on-scan) tags per data server
4. No more than 10 HMI clients per data server

With RSLinx Enterprise, the recommended maximum values for each of these variables are:

1. No more than 20 Logix controllers per data server (via Ethernet)
2. No more than 20 PLC/SLC controllers per data server (via Ethernet)
3. No more than 20,000 active (on-scan) tags per data server
4. No more than 20 HMI clients per data server

If a proposed system exceeds these recommendations, then additional data servers may be required as a result. Note that the recommended maximum values are not hard-coded limits and must only be considered as a recommended best practice.

### RSLinx Classic vs. RSLinx Enterprise vs. 3rd Party OPC

When designing an application, do not duplicate references to Live Data Servers (RSLinx Classic, RSLinx Enterprise and 3rd Party OPC Servers) in the View SE application. Tags from a single Live Data Server may be referenced from any HMI project in any area of the application.
As mentioned previously, it is recommended to place all Servers (HMI and Data) in their own individual Areas. [Answer ID 29663 - RSView SE Area Best Practices]

Data Server Load Balancing
- ControlLogix CPU utilization, with communications enabled, should be kept at about 40% average during normal run time.
- It is recommended that spare memory in the controller be reserved to accommodate for tag lists
  - Amount of memory varies depending on the type of data being read
  - Data in structures and arrays require less space than individual tags

RSLinx Classic:
- When using Alias Topics never use “Switch on Error” when communicating to ControlLogix processors. [Answer ID 26228 - Using RSLinx Alias Topic "Switch On Error" and "Switch On Command"]
- Can communicate with SLC/PLC/CLX controllers (including PLC-2, PLC-3 and PLC-5/250)
- Complex communication routing. Protocol changing (ex. Ethernet to DH+)
- Can serve OPC data
- RSLinx connections to processors on an Ethernet network. [Answer ID 7480 - RSLinx; Ethernet Networks; Problems and Solutions]

RSLinx Enterprise:
- Preferred View SE Live Data Server to Rockwell controllers
- Can communicate with SLC/PLC/CLX controllers (excluding PLC-2, PLC-3 and PLC-5/250)
- Can serve OPC data with the addition of FactoryTalk Gateway

3rd Party OPC servers
For an OPC Server to successfully and efficiently be added to FactoryTalk Live Data:
- it must be fully compliant with the OPC DA 2.0 specification
- it must be designed to accept "Out of Process" calls made to it as a service.
- it should be running as a Windows service
  - [Answer ID 31195 - Third Party OPC Servers in a FactoryTalk Application should be configured to run as a Windows Service]

Further information about 3rd Party OPC servers, including how to add them to a FactoryTalk application can be found in the PDF document attached to [Answer ID 65406 - Using FactoryTalk Applications with Third Party Devices]

**RSLinx Classic Remote OPC Server** must be selected under the "OPC Server name (ProgID):" when configuring RSLinx as an OPC Live Data Server in View SE. Regardless of where the actual copy of RSLinx.exe is running the "RSLinx Remote OPC Server" option must be selected in order to prevent problems accessing OPC Topics. To better understand what is remote vs. what is local, the Live Data Server should be viewed from the SE Client point of view and not the HMI Server. In most cases Live Data Servers will be remote from the SE Client point of view. In the rare case where an SE Client may host a Live Data Server, using the "RSLinx Remote OPC Server" configuration will not cause any problems.
**FactoryTalk Gateway**

- FactoryTalk Gateway is an OPC server that enables OPC clients to connect to FactoryTalk applications that contain RSLinx Enterprise and FactoryTalk View Site Edition servers. By doing so, they can access tag data within those applications.
- It is OPC Version 2.05 compatible.
- FactoryTalk Gateway Station is for use on stand-alone, local applications.
- FactoryTalk Gateway Distributed is for FactoryTalk network applications.
- Only one FactoryTalk Gateway can be installed per computer.
- Multiple FactoryTalk Gateways can point to a single FactoryTalk application.
- FactoryTalk Gateway can only point to a single FactoryTalk application at a time.
- FactoryTalk Gateway can communicate to as many unique tags as licensed.
- 20 remote OPC clients have been formally tested and validated against FactoryTalk Gateway.
- FactoryTalk Gateway v3.00, released in CPR9 SR2, must be used with RSLinx Enterprise v5.00 and View SE/ME V5.10 also released in CPR9 SR2
- For additional information, refer to [Answer ID 45470 - RSLinx Enterprise Getting Results Guides](#).

**RSLinx Classic with a Logix Controller**

Please be aware that there are known issues when online editing or downloading to a Logix Controller, particularly when RSLinx Classic is being used as the Live Data Server. If a client application requests tag data, RSLinx Classic will group the tags into packets, and put these packets on scan with the controller(s). If an online edit or download causes a change to the controller’s data table for a data packet on scan, the packet may need to be taken off scan, and put back on scan for the changes to be reflected.

This may be as minor as navigating off a particular HMI Display to take the tags off scan, and then navigating back to the display; however, in larger, distributed applications (particularly with alarms, event detection, data logging, etc. all enabled), it may be operationally difficult to achieve this short of rebooting the RSLinx Live Data Server. This would obviously affect ANY client requesting data from this instance of RSLinx Classic.

Many of these issues have been addressed with RSLinx Enterprise, which was designed specifically for the Logix family of controllers, and why RSLinx Enterprise is the recommended Live Data Server for this platform.

RSLinx Classic was originally designed for the structured data tables of the SLC and PLC product lines. The Logix platform introduced new communication and memory performance parameters that can affect RSLinx Classic. For this reason, RSLinx Enterprise was designed to be the preferred communication server for the Logix platform. Please consult the local Rockwell account representative for a complete comparison. [Answer ID 30605 - Runtime Editing with RSLinx Classic and Logix Processors](#).

**System Security**

Security threats to a Process Control System generally fall into 4 categories: external, internal, intentional and accidental. Detailed security recommendations against external threats are beyond the scope of this document. However, there are some basic measures that should be taken to protect against the most common threat – the day-to-day users of the HMI system. Recommendations in this area include:
• Password protect the computer’s BIOS: to prevent booting from anything other than the local hard drive, configure the computer to boot only from the hard drive, and then configure a BIOS password so that mischievous users cannot change the boot device
• Password protect the local Administrator account: this often overlooked task is critical
• Configure the Windows environment so that it is “strictly business” for the operators: restrict access to required applications only using Group Policy (in a domain) or Local Policy (on an individual machine or workgroup). Rockwell Software’s DeskLock can also be used for this purpose.

FactoryTalk Security

FactoryTalk Security authenticates user identities and authorizes user requests to access a FactoryTalk-enabled system. These security services are fully integrated into the FactoryTalk Directory and are included as part of the FactoryTalk Services Platform. FactoryTalk Security includes user authentication that determines who can open, create, modify, and delete application components, and on which computers the actions are allowed. Use FactoryTalk Security to add user and group security accounts as well as Windows-linked accounts, and set up security for common actions such as tag writes, open, and delete.

FactoryTalk Security can be configured to:
• Prevent writes to specified tags from the View SE Client.
• Prevent access to specified displays from the View SE Client.
• Prevent access to specified commands from the View SE Client
• Prevent changes to the application from FactoryTalk View SE Studio or the FactoryTalk View SE Administration Console.

To open the FactoryTalk View SE User Accounts editor or the Secured Commands editor, the user requires access to the Common/Create Children action, in addition to the Common actions, Configure Security, List Children, Read, and Write, on the area or application.

• FactoryTalk Security Quick Start Guide

Answer ID 30980 - FactoryTalk Security - Tips and Best Practices
Access to Open an Application

To open an application in View SE Studio, the user must have read/write access to the sub-folder that holds the HMI projects. If, for example, the security designation for View SE Studio users is Power Users, they will not necessarily have write access.

To make sure that the settings for Power Users are correct, navigate to the sub-folder that holds the HMI projects; right-click; select Properties. Refer to “Default File Locations for SE Distributed Applications” earlier in this document for folder locations.

In the Security tab of the Properties dialog, select Power Users from the list of groups and user names. In the Permissions box below the list, select Full Control and check the Allow check box.

Additional information:
Answer ID 26251 - DCOM Security Settings for RSView SE Remote Logging

Answer ID 28967 – Starting an RSView SE Data Log into a remote ODBC Database on Boot, without logging in.

Answer ID 39984 – SE Alarming: How to enable the SE Alarm Logger to log to a remote machine.

Answer ID 29103 - Virtual Private Networking (VPN) Connections for Remote Communications Across the Internet
Thin Clients: Windows Terminal Services


- Terminal Services is a standard feature built into the Windows Server family (Server, Advanced Server, and Datacenter Server) which provides remote access to servers from practically anywhere in the enterprise. It is a transparent system that runs applications and performs data processing and storage functions on the server computer to minimize the amount of information traveling across the network. While multiple sessions run on a single server, each user can only refer to their individual session. Users’ desktops are transmitted to clients for display using terminal emulation software. Similarly, the software sends print streams and command functions such as keyboard inputs and mouse clicks across the network between the client and the server.
- For a computer to be a Terminal Services client, it only requires an operating system and the Terminal Services client software. No other software (not even a web browser) is required. For this reason, these clients are known as “thin” clients.
- Since minimal software is needed on the client computer and all the processing is done on the server, client computer hardware can be scaled down to reduce cost.

Thin Clients: FactoryTalk Viewpoint

FactoryTalk Viewpoint is a service that web-enables a View SE HMI application and allows viewers to see real-time plant floor operations data simply by logging onto an Internet browser. Some features of Viewpoint include:
- Automatic Display Scaling
- Maintain a Fully Active Browser
- Multiple Display Browsing Made Easy
- Easily Set-Up and Access Favorites
- Casual User Accessing Information

Displays in a FactoryTalk ViewPoint application are read-only. Graphic objects in the displays are fully animated; however, they cannot be used to write to tags or to start and stop HMI components.

FactoryTalk Viewpoint uses Microsoft Silverlight as browser plug-in to display fully animated graphics; however, some features supported by View SE are not supported within the Viewpoint/Silverlight architecture. An outline of the supported features is included in Answer ID 57596 - FactoryTalk View SE Feature Support within FactoryTalk ViewPoint.

FactoryTalk ViewPoint SE 1.1 supports FactoryTalk View SE 5.1 only. For complete information about version compatibilities between FactoryTalk Viewpoint, FactoryTalk View ME and FactoryTalk View SE, consult Answer ID 62112 - FactoryTalk ViewPoint Compatibility Matrix.
System requirements to use FactoryTalk Viewpoint SE v1.1 can be found in Answer ID 66342 - FactoryTalk ViewPoint SE v1.1 - System Requirements

Links to further documentation can be found in Answer ID 57990 - FactoryTalk ViewPoint Tips and Best Practices TOC.

Time Synchronization

The Windows Time service (W32tm.exe) uses the Network Time Protocol (NTP) to synchronize computer clocks on the network. Time synchronization is critical for the proper operation of many Windows services and to ensure the security of Kerberos authentication within an Active Directory environment. In a View SE distributed system, time synchronization ensures accurate time stamps on alarms and diagnostic logs. Therefore, configuring time synchronization is highly recommended.

- In workgroup environments, configure Windows Time to synchronize all the SE computer clocks to an authoritative time server (e.g. the FactoryTalk Directory).
- In domain environments, Windows Time should be automatically configured on each computer (when they join the domain) for the appropriate authoritative time server (i.e., the domain controller that is also the PDC emulator).
- In either environment, the authoritative time server should then be synched to:
  - a reliable time server on the Internet
  - a locally-connected hardware time source such as an atomic clock
- Check the Event Viewer System log of each computer to verify that the time is being updated properly.

How Windows Time Service Works

Windows Time Service Tools and Settings
http://technet2.microsoft.com/windowsserver/en/library/b43a025f-cce2-4c82-b3ea-3b95d482db3a1033.mspx?mfr=true

Administering the Windows Time Service
http://technet2.microsoft.com/WindowsServer/en/library/ac86e77c-0be3-430a-ba0b-c2225506fc4f1033.mspx?mfr=true

How to configure an authoritative time server in Windows Server (2003 and 2008)
http://support.microsoft.com/kb/816042

How to configure an authoritative time server in Windows XP
http://support.microsoft.com/kb/314054/

How to configure an authoritative time server in Windows 2000
http://support.microsoft.com/kb/216734/
HMI Tags and Direct Referenced Tags


**Tag related limits**
- An HMI Server supports 40,000 alarmed tags, 10,000 of them can be analog alarms.
- Each graphic display can contain up to 3,000 references to expressions or tags (HMI and Direct). This limit includes duplicate tags and tags contained in embedded variables.

**Tag Database (HMI Tags)**
- Very useful when creating similar controls. Parameter files can reference directory folder structure or tags for quick duplication of controls
- Easy to do Tag Replacement (search and replace)
- HMI tags must be used (that is, Direct Referenced tags can not be used) for any of the following components in the application
  - Alarms
  - Security (can not set security to Direct Referenced tags)
  - Data manipulation (Live Data Server does not provide: scaling, offset values, setting minimum or maximum limits on values)
- For optimum performance, do not place all the HMI tags in the root folder. It is also recommended that the number of tags in a folder be limited to less than 1000. HMI tags contained in nested folders do not contribute to the number of tags in the root of the folder. Answer ID 29266 - Slow object animation performance when opening HMI displays.

**Direct Referenced Tags**
- No need to build or create a tag database since tags are directly referenced from the controller
- Provides access to complex data types in the Logix5000 environment. Reference the tag values directly, and eliminate the need to createan HMI tag for each member element.
- Parameter files can be used with Direct Referenced Tags
- Tag Replacement can be used with Direct Referenced Tags
- Security cannot be configured; however, an easy workaround is to use the function UserHasSecurityCode() with visibility on Input fields. Answer ID 46484 - How to apply security on tags when using direct referenced tags.

**Alarm Acknowledge Bit**
The acknowledge bit is used for telling other View SE applications or controllers that a tag has been acknowledged. When an acknowledge bit for a tag is set up, all HMI servers automatically monitor that bit at run time. When an operator acknowledges an alarm for the tag, the acknowledge bit is set. All other HMI servers then acknowledge the alarms associated with that bit. This means operators can acknowledge an alarm in one application and have it recognized in other applications (i.e. global alarm acknowledge between applications).
One acknowledge bit can be setup for each tag, one for a group of tags or one for all tags. The more acknowledge bits that are set up, the greater the system overhead. If possible, group alarms to share an acknowledge bit.

A burst of alarms or alarm acknowledges will induce a high amount of read/write traffic over a very short period of time. Acknowledge bits as well as Handshake bits should be accounted for when determining the total number of tags on scan.

**Calculate number of tags on-scan**

To calculate the maximum number of tags that could possibly be on-scan from a Live Data Server (ex. RSLinx) add all of the following: (if a tag is used in multiple places it only counts once)

- Tags on graphics being displayed (or having been displayed if displays are configured to cache and always update)
- Alarm and Alarm Acknowledge tags
- Tags in Derived tag equations (only derived files running)
- Tags in Event files (only event files running)
- Tags in Data Logs Models (only models that are running)
- Handshake tags
- Tags that Macros or VBA are Reading or Writing to
- Also take into consideration other applications like RSSql and RSBatch that may be using the same Live Data Server

**Data Logging**

Data logging is a View SE component that collects and stores tag values. Using a Data Log Model, the tag values to be collected are specified, as well as when to collect them, and where to store them.

When planning data collection, design the system so only essential data is collected. Limiting data collection is important because collection activities require substantial processing power and generate significant traffic on the communication channel or network.

Keep data collection requirements in mind when designing the layout of the programmable controller data tables and the tag database. Ideally, tag addresses should reference contiguous blocks of programmable controller data tables to reduce network traffic and optimize system response.

In a redundant SE system it is suggested to log to a third computer as opposed to locally, in doing this there is only one location to manage the data and there is no need to merge multiple files or databases together after a failover or switchover.

**Data Logging to Secondary Path**

FactoryTalk View SE allows for a secondary or backup path to be specified if the primary path for file sets or the ODBC database becomes unavailable. This could happen because of network failures or because of lack of disk space on the computer where the data is being logged.
If the primary data log location becomes unavailable, View SE begins to store the data in a buffer. The buffer can hold up to 64 Kb of data. If the primary location is still unavailable when the buffer fills, or when the maximum amount of time to buffer data has elapsed, View SE switches to the secondary path.

View SE checks periodically to determine whether the primary file path has become available again. If it has become available, View SE switches back automatically.

If both paths are unavailable, View SE buffers the data. If the buffer fills and both paths are still unavailable, View SE empties the buffer (the data in the buffer is lost) and begins storing new data in the buffer. View SE continues checking both paths until one becomes available.

**Multiple data log models**

At run time, up to 20 models can run simultaneously on each View SE Server. Use multiple data log models to:

- Store related information in separate file sets
- Log groups of tags at different rates
- Log groups of tags based on events

**Data Log Storage Formats**

Logged data is stored in either an internal file set, providing faster performance for historical trends, or in an ODBC compliant database. If a file set is used, tag values are stored in proprietary format files. Trend objects can read the data to plot in a graphic display.

If values are stored to an ODBC compliant database, it is highly recommended that this be a separate database server and not an SE Server. This data can then be viewed using FactoryTalk Historian Classic, FactoryTalk Historian Site Edition, or in third party ODBC compliant tools such as Microsoft Excel or Seagate Crystal Reports.

If the ODBC database becomes inaccessible, View SE logs the data to backup files in proprietary format. The location of backup files is configurable.

**Trending**

- When planning trends, consider how they will be used. For example, will the trend be used to:
  - Analyze process trends
  - Monitor production efficiency
  - Archive process variables to ensure compliance with government regulations
- Based on such considerations, it can be determined:
  - Which tags need to be plotted on the same trend
  - Which tags need to be plotted from a data log model or FactoryTalk Historian
  - Which tags need to be plotted against time, or against another tag
- Trends can display real-time or historical data, from data log models or FactoryTalk Historian, with up to 100 pens (tags) in each trend. (Improved in CPR9 SR2!)
- Trend Templates may be used to create preconfigured trend objects for use in graphic displays.
- Trend Snapshots may be used as overlays with real-time trends.
Graphic displays that contain trend objects created in previous versions of View Studio may need to be opened in View Studio 5.10 and re-saved to ensure that they work correctly at run time.

For more information, refer to Answer ID 39463 - RSView Supervisory Edition Trending Best Practices

Database Considerations

Oftentimes View SE data logging, FactoryTalk Transaction Manager data logging or FactoryTalk Historian Classic reporting gets blamed for being slow when it is truly the fault of the database. Commonly, a system will perform well at startup, but will see performance degradation as time goes on – this is a symptom of the database growing larger and communicating slower.

The larger a database gets, the longer it takes for SQL queries to execute. Report generation will also be impacted as the size of the database grows. Proper database management will be required to maintain a responsive reporting system. Server hardware will also play an important role in the responsiveness of the database.

Additional information:

- SQL-Server-Performance.Com
- Oracle DBA Information

Language Switching

Language switching allows operators to view user-defined text strings in an application, in up to 40 different languages. At run time, in a distributed application, multiple View SE clients can switch between any of the languages the application supports. Multiple clients can also run in different languages, at the same time. For more information, refer to Chapter 12 of the FactoryTalk View SE Site Edition User's Guide or the online help.

Generally, it is best practice to develop all the screens in one language first, then import the translations at the very end. Once translated, all screen text edits and additions must be updated in both languages.

Global Objects

A Global Object is an object that is created once and can then be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the copies (reference objects) are changed as well. For more information refer to Chapter 15 of the FactoryTalk View SE Site Edition User's Guide, and the online help.
Graphic Displays

Develop a hierarchy of displays with each display giving more granular detail of an object, area or function. This prevents displays from being cluttered by attempting to display a large amount of information at one time. This also reduces the demands on the Live Data Server from having to poll and display a large amount of unnecessary data.

Create templates to ensure consistency of appearance.

Each graphic display can contain up to 3,000 references to expressions or tags (HMI and Direct). This limit includes the tags contained in embedded variables.

When importing a large graphic object (*.jpg, *.bmp) to use as a background. Converting the object to wallpaper will allow smoother mouse control over the object and provide a better environment for developing the graphic. It also saves memory for faster display of screen.

Consider using faceplates. Faceplates are standard screens that can be used (and re-used) within an application. Faceplates can correspond to a Logix5000 instruction, a tag structure within Logix5000 AOI, or any group of tags that is repeated through an application. Process faceplates can be included in any application by right-clicking on the HMI server in Studio and selecting “Add Process Faceplates…”

Other device or application-applied faceplates can be downloaded from the Rockwell Automation Samplecode website: [http://samplecode.rockwellautomation.com](http://samplecode.rockwellautomation.com)

Refer to Chapter 19 of the FactoryTalk View SE Site Edition User’s Guide or the online help.

Importing and Exporting Graphic Display XML Files

FactoryTalk View SE stores graphic displays in a proprietary format using a .gfx extension (e.g., DisplayName.gfx). However, the Graphics Import Export Wizard in FactoryTalk View SE Studio allows for both graphic displays to be exported to an XML file, and graphic displays to be imported from an XML file. The XML files can be edited to modify objects that already exist or to add new objects.

A display cannot be imported or exported that is currently open in the same instance of View SE Studio. Having the display open in a second or remote instance of Studio will not cause it to fail. However if an older version of a display is open and it is saved after the import has been done, the imported changes will be overwritten.

**ActiveX Components**

An ActiveX object is a software component that is supplied independently from View SE through products such as Microsoft® Office XP, Visual Basic®, and many other third-party applications.

An ActiveX object gives access to its features through the object’s properties, events, and methods. By embedding an ActiveX object in a View SE graphic display and then assigning properties or specifying handlers for the object’s events, the object can interact with FactoryTalk View. Information is passed between an ActiveX object and View SE using View SE tags.

For example, Microsoft Forms ActiveX objects can be embedded in View SE graphic displays. If a View SE tag is attached to an ActiveX object’s Value property, the object’s behavior changes as the tag’s value changes.

Be aware that ActiveX versions may vary based on the operating system and in turn may not work properly. For example if the Server is running Windows 2003 and the Client is Windows XP the installed ActiveX components may be different. This is only a concern if ActiveX components are embedded in View SE graphics or a VBA form. [Answer ID 29730 - How to register an ActiveX control in Win32 Windows 2000/XP computer.](#)

**Visual Basic for Applications**

Visual Basic for Applications (VBA) can be used to customize and extend the capabilities of View SE. View SE graphic displays include the ability to incorporate Microsoft Visual Basic for Applications (VBA) scripts. Use the VBA integrated development environment (IDE) to create, test, and debug VBA procedures that run in response to events triggered from within View SE graphic displays.

- **VB third-party access to the View SE Display Client object model, which includes the Tag and Graphic object models, is currently not supported.** Access to the View SE object model is available only within the View SE client’s VBA.
- **Limited support is available through Rockwell Automation Technical Support for customers needing assistance debugging their VBA scripts. A maximum of 20 lines of code per problem can be considered.**
- **The version of Visual Basic for Applications that is supported by View SE for its object model has been updated from 6.3 to 6.4 (VBA 6.4 for View SE versions 3.2 through 5.0)**
- **Use of custom VBA code should be limited. Only use when a native feature of the product does not meet the necessary requirements.**
- **VBA is single threaded.**
- **VBA is not recommended for continuous calculations.** For continuous calculations the use of an OCX or EXE is recommended only if derived tags are not suitable.
- **VBA is not compiled code.**

Additional information:
- [Answer ID 30399 - Recommendations For Writing Visual Basic for Applications in RSView SE](#)
If VBA is used in an application, be sure to include proper error handling. Since the VBA process is single-threaded, if the code encounters a problem, the client may act unexpectedly and require a restart. For more information, see Answer ID 51771 - Sample VBA: Learn Error Handling Techniques.

**New faceplates for RSLogix 5000 Advanced Process Control Instructions (New in CPR9 SR2!)**

New faceplates for the Advanced Process Control (APC) instructions are now included with the product. These instructions were introduced in the RSLogix 5000 V17 release and the faceplates correspond directly to these instructions and provide a way to visualize what is happening within the process.

All three APC blocks rely on “Internal Models” of the process being controlled.

**Internal Model Control (IMC)** – Compares actual process error against error calculated by an internal first order lag plus deadtime model.

**Coordinated Control (CC)** – Controls a single process variable by manipulating as many as three different outputs.

**Modular Multivariable Control (MMC)** – Controls process variables to their setpoints using up to three controller outputs.

The APC function blocks are purchased separately and licensed per use.

The RSLogix 5000 v17.00 Help file has limited information when searching for the instruction mnemonics, so for complete details, see Answer ID 54859 - Advanced Process Control Instructions (IMC, CC, MCC)

**FactoryTalk View SE Enterprise Tools (Improved in CPR9 SR2!)**

- **Application Documenter** is a stand-alone utility that provides detailed information on SE or ME projects and is now installed with the product. It allows the contents of the project’s components and the tags used in these components to be viewed in a browser. If using a software version prior to CPR9 SR2, download the utility from Answer ID 46928 – FactoryTalk View Project Documenter.
- **Application Manager** is software for moving, copying, renaming, backing up, and restoring applications.
- **DeskLock** is software that locks users in the View SE Client program and prevents them from having access to the Windows desktop and using Windows system keys.
- **FactoryTalk View SE Secure Web Site Setup** is software that allows for a secure web site to be configured that IIS will use instead of its default web site, to transfer information between HMI servers and clients in a FactoryTalk View SE network application. For information about when and how to enable it, refer to Answer ID 39618 - FactoryTalk Internals: FactoryTalk View Site Edition IIS Handbook.
- **HMI Server Backup and Restore** is software that allows one to back up an HMI server’s project components while the HMI server is running and is now installed with the product.
• **FactoryTalk View SE Administration Console** is software for administering FactoryTalk View SE Site Edition applications after they have been deployed.

• **SE HMI Tag Alarm Log Viewer** is software for viewing the contents of alarm log file sets.

• **FactoryTalk View SE Service Manager** is a tool for starting and stopping HMI servers. For example, use this tool to stop an HMI server before copying its set-up files to a redundant server.

• **Tag Import and Export Wizard** is software for importing or exporting the FactoryTalk View SE Server’s tag database.

**Naming Components**

- View SE supports long file names. File names, including the path can be up to 200 characters long. For example a graphic with the name “System Overview” has 15 characters in it but has 118 characters in its full name because of the directory structure “C:\Documents and Settings\All Users\Documents\RSView SE Enterprise\SE\HMI Projects\My Application\Gfx\System Overview.gfx”

- Names that conflict with commands and macros: To avoid problems when issuing commands and macros, do not use command names to name macros. For example, to avoid confusion with the Display command, name a macro that displays screens something like DisplayScreen or MyDisplay instead of Display.

**Overall Considerations**

- The browse button appears beside data entry fields. Type information into the field or click the browse button to open a list containing valid entries for the field. Using the browse button will prevent typographical errors from requiring a debug later in the application development.

- During the design phase and before the development portion of the project, talk to the operators, maintenance personnel and other experts who are going to use the system. Find out what information they need to optimize plant operations to allow for efficient design and implementation of the application.

- Keep update rates only as fast as necessary for the processes like Tag Read/Write, Data Logging, Derived Tags or Events. Their update rates are important and can have a direct influence on the performance of the HMI server and clients. The update rate is also influenced by the rate that the tag in the target device changes.

- When creating graphic screens, selecting ‘Replace’ will cause the currently displayed screen to close while opening the newly requested screen. If ‘Overlay’ is selected, it must be managed more closely. It is possible for multiple screens to be open one on top of the other using up memory and CPU resources unnecessarily. Refer to the online Help for more information.

HMI startup components (services) have two options, ‘On Demand’ and ‘Load and run startup components when operating system initializes’. This setting can be accessed in View Studio or the Administration Console by right mouse clicking on the HMI Server icon and selecting properties. In general ‘On Demand’
is selected during development so that all the services do not startup every time the HMI Server is started. Once the system is deployed – or if redundancy is desired- it should be set to ‘Load and run startup components when operating system initializes’.

<table>
<thead>
<tr>
<th>Startup Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>On demand (Redundancy will be disabled)</td>
</tr>
<tr>
<td>Load and run startup components when operating system initializes</td>
</tr>
</tbody>
</table>

- When using 10/100Mb Network Interface Cards (NICs) and switch ports, do not leave them at auto detect. Set them at 100Mb / Full Duplex unless communicating to older 10Mb hardware, in that case set the speed at 10Mb and not 100Mb. Leaving network ports at ‘Auto’ and the NICs at hardware defaults may degrade network throughput dramatically.
- Ghosting may be used in order to be more efficient in setting up a large system. However, this may cause an issue with communications due to duplicate serial numbers. Answer ID 30727 - Ghosting / Imaging multiple computers with RSLinx Enterprise will cause serial number duplication problems and will require registration modification

**How to determine what SE projects load when O/S initializes**

HMI servers in a distributed View SE project can be configured to launch in one of two ways:

- On demand, when a client attempts to make a connection to them, or
- Load and run when the operating system initializes

This selection is made in each HMI server's "Properties". Over time, as new projects are developed and tested, it can be easy to forget which HMI servers are automatically running every time the computer starts. Since each HMI server uses memory, CPU time and Activations, this becomes an increasing burden on the computer.

To determine which HMI Servers are loading automatically, open the following file: C:\Documents and Settings\All Users\Documents\RSView SE Enterprise\SE\HMI Projects\SLHMIServers.XML (default location).

If it can't be found, that means that all of the HMI projects are configured to run On Demand. The first time one of the projects is configured to “Start On Boot”, the XML file will be created. Another way to force the XML to be created is to change the startup setting from "On Demand" to "Load and run startup components..." and immediately back to "On Demand", and then click Apply/Ok. The above applies to all FactoryTalk View SE versions 3.0 and above.

Additional information can be found in Answer ID’s:
- Answer ID 26334 - How to determine what SE projects load when O/S initializes, and how to prevent them from loading automatically
- Answer ID 24896 - RSView SE Studio is unable to attach to an existing HMI server
- Answer ID 27207 - Renaming an RSView SE application causes its HMI Servers to lose its startup properties
Designing A Multi-User System

When an application is run by multiple users, behavior which is appropriate in a single-user environment might not be appropriate. For example, if a graphic display that is running on several clients contains a shutdown macro that stops a derived tags file. When the display is closed on one client, the shutdown macro will stop the derived tags file. This would affect the display on the other clients, because the derived tags file resides at the server. This would be true of all server side components like Alarming, Data Logging and Derived Tags.

Languages

- Do not install a local language version of View SE (for example, German, French or Japanese) on an English Operating System (Windows 2000, XP Pro, Server 2003 Standard Edition, or Server 2008 Standard) or errors may occur. Use the same localized version of the desired operating system for best results.
- FactoryTalk View SE has been tested on English versions of Windows with English (US) settings. Should other configurations encounter issues, please report them to Technical Support.

Miscellaneous Procedures

- Before any Tags are deleted from the online ControlLogix Tag Database, they must first be removed from View SE Application. This includes all reference used in Tag Database, Display Animation, VB code, Event File, Derived Tag File, and Data Log Model. This will remove tags from the scan list and prevent communication errors that can disrupt the performance of the application.
- Frequently users want to monitor the utilization and performance of the various components of a View SE system and be automatically alerted if a process begins to consume too many system resources. For information on how to accomplish this refer to technote Answer ID 31196 - Monitoring FactoryTalk View SE memory and CPU usage using Performance Monitor

RSView32 to View SE Conversions

Based on RSView32 v7.0 and FactoryTalk View SE v3.10

The following objects won't convert from RSView32 to View SE:

- VBA
- Native trends
- Tag monitors
- Command lines embedded in graphics
- External applications that depend on RSView32 to be an OPC or DDE Live Data Server
- Alarm Summaries

Certain ActiveX controls may not function as they did in RSView32. These will need to be evaluated on a case by case basis.

To migrate an RSView32 project to a View SE distributed application, do not use the ‘Attach’ option. Instead, create a new HMI server by importing the project. To do this, select 'Import a project' in the Select Operation window of the Add HMI Server Wizard. Then in the Import Project window, select RSView32 as the project type and specify the path to the RSView32 project file.
For a complete list of commands that can not be executed in View SE refer to Technotes:

- Answer ID 27708 - RSView32 to RSView SE upgrade issues
- RSView32 to RSView SE Migration Considerations (via RSI Extranet)
- Answer ID 51770 - Sample VBA: Exercise in migrating a View32 application with VBA to ViewSE

**ControlLogix Redundancy (v13 and above)**

*Automatic IP Address Swapping*

During a switchover, 1756-ENBT and 1756-EWEB modules now swap their IP addresses with their partner modules in the other redundant chassis. This allows the Live Data Server to use the same IP address to communicate with a primary module regardless of which CLx chassis is the primary.

- Typically, the ControlLogix Redundancy Alias Topic Switcher software is no longer needed to manage the IP addresses. If the application still requires alias topics to manage IP addresses, refer to ControlLogix Redundancy System User’s Guide, publication 1756-UM523.
- In a ControlLogix redundant configuration, when the controller fails over to the secondary chassis the IP address of the ENBT is swapped with the module in the primary chassis. RSLinx Enterprise can take > 32 seconds to recognize this change. Refer to Answer ID 31520 - Understanding HMI Switch Overtimes when using Ethernet/IP Swapping and ControlLogix Redundancy for details.
- If bumpless communication between Live Data Servers and CLx controllers is required, use a separate ControlNet network that is dedicated to communication with those devices.

In a redundant system, use an Ethernet/IP network only for HMI/workstation communication and messaging. Do not use an Ethernet/IP network for:

- communication with I/O modules
- communication between devices via produced/consumed tags

**Tricks and Tweaks**

- Answer ID 22007 - How to trigger a command on an SE client from an HMI server
- Answer ID 29298 - How to play an SE client wave file triggered off of an alarmed tag
- Answer ID 31307 - How to AppStart the Windows “User Account” Manager from RSView32/RSViewSE
- Answer ID 33075 - How to print a text file using VBA and Notepad
- Answer ID 50813 - Sample VBA: Position a popup or faceplate in SE relative to the clicked mouse position.
- Automatic logout of FactoryTalk. Answer ID 32566 – Studio seems unresponsive and generates: The requested Access Check failed because the token has expired
- Answer ID 41060 – How to move the FactoryTalk Diagnostics Log to Another Location
- Answer ID 41498 - Tips for viewing the FactoryTalk Diagnostics logs of several computers simultaneously
- Answer ID 36594 - How to disable Alt-F4 and Ctrl-F4 in an RSView SE client.
Tools and Utilities

- Answer ID 30393 - Patch File Validator Utility
- Answer ID 31196 - Monitoring RSView SE memory and CPU usage using Performance Monitor
- Answer ID 30148 - Using RSLinx Enterprise Diagnostic Counters - Predefined items
- Answer ID 30498 - Windows Firewall Configuration Utility for Windows XP Service Pack 2
- Answer ID 29942 - RSView SE Graphic Tags Search and Replace using Graphics XML Exported Files
- Answer ID 20697 - Troubleshooting a Windows Network
- Answer ID 31073 - Tool for collecting Event log files

Additional Reference Links

**FactoryTalk View Site Edition (Network)**

- FactoryTalk View SE Installation Guide
- Answer ID 39431 - Common Recommended Settings and Considerations for a FactoryTalk View SE Distributed (RSView SE) and RSView32 Active Display Systems
- Answer ID 60716 - FactoryTalk View 5.10.00 (CPR9 SR2) Patch TOC (Now for SE and ME!)
- Answer ID 44190 - Upgrading from RSView SE 4.00 and earlier, to FactoryTalk View SE 5.00 (CPR9)
- Answer ID 20450 - FTView SE Operating System and Service Pack compatibility
- Answer ID 40891 - FactoryTalk View SE 5.0 (CPR9) Server Redundancy Guidelines
- Answer ID 23120 - Applying RSView SE in a 21 CFR Part 11 environment
- Answer ID 34321 - Using RSView SE Distributed with multiple monitors

**FactoryTalk View Machine Edition**

- FactoryTalk View Machine Edition Install Guide
- Answer ID 60716 - FactoryTalk View 5.10.00 (CPR9 SR2) Patch TOC (Now for SE and ME!)
- Answer ID 32590 - ME to SE Conversion revision 4.0
General

- Answer ID 35330 - Rockwell Software Products and Antivirus Software
- Answer ID 42682 - Software Platform\Hardware Compatibility Matrix
- Answer ID 20440 - Compatibility Matrix of RSI/AB software on Windows XP Pro
- Answer ID 28293 - Compatibility Matrix of RSI/AB software on Windows XP Pro Service Pack 2
- Answer ID 27743 - RSI Products and Intel Hyper-Threading Technology

Communications

- Answer ID 22199 - RSLinx Classic Service Pack/Hotfix TOC
- Answer ID 54605 - FactoryTalk Services Platform 2.10.02 (CPR9 SR2)/RSLinx Enterprise 5.20.00 (CPR9 SR2) Patch TOC
- Answer ID 26464 - RSLinx Internals: OPC/DCOM timeouts when a remote client is disconnected

ControlLogix

- Answer ID 45926 - Logix 5000 Tag Import Utility for RSView32, RSView ME / SE and RSSQL
- Answer ID 6408 - Logix Data Collection Application Guide
  - general performance and application design information on the packet optimization features added to RSLinx
- ControlLogix Enhanced Redundancy System User Manual
- ControlLogix Data Collection with RSLinx
  http://www.software.rockwell.com/download/comms/rslinx/clx_perf.zip
- Logix 5000 Controllers Design Considerations
- ControlLogix Redundancy System Revision 13
- ControlLogix Enhanced Redundancy System Revision 16.80

Microsoft

- Microsoft TechNet article: Domain Controllers
- Article ID: 146219 - How To Register an ActiveX Control (.ocx) Manually
- Microsoft TechNet article: Maximize Data Throughput Setting for Performance
- Article ID: 259025 - Microsoft’s Description of Performance Options in Windows
- Log Parser 2.2 Download