



Next Generation Historians

Improve historical data access and analysis while reducing costs

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1. Introduction

Most companies today are organized into multiple departments, each with their own set of functions, duties, priorities, and users. Ensuring that each user has access to the right data at the right time and in the right context is paramount to maximizing efficiency and productivity, and keeping costs low. Prime examples of this are the operational users at the control layer and analytical users at the corporate layer of the business. Although each user needs the access to consistent and reliable data, they have very different needs for the use of data.

An advanced and cost-effective solution from Wonderware® can solve this problem by isolating the SCADA domain (Control Network) from the business domain (Corporate Network). It allows customers to easily configure cost-effective domain isolation of the Control Network from the Corporate Network, while fully maintaining data integrity and security. This enables production to be completely isolated while fully integrated with the business systems – a welcomed option for both Production and IT managers. Next generation historians from Wonderware can help companies dramatically reduce capital costs associated with the perimeter hardware, while ensuring high availability of historical data and advanced trending capabilities at both the control level and the business level.

This white paper discusses the issues concerning the access of data across the enterprise; the need for domain isolation; and the solution based on a new generation of Historians.

2. Historical Data – Types, Usage and Management Challenges

The use of historical data within manufacturing, infrastructure and process industries can be divided into two main categories: Operational and Analytical.

Operational uses of historical data focus on short-term time horizons used to run the facility. This involves real-time trending for the understanding of current state and process movements and directions. At the operational level, recent historical trending and reporting of historical data are required for decision making. The time horizon of operational needs typically ranges from hours to days, but is usually less than a week. This information is also required to be at full process fidelity. And the information must be easy to comprehend so that it could resolve the process at its native time constant. For a motor current or flow rate this time constant is millisecond or second based. For a level or environmental measurement this time constant could be minute based. The basic premise is that resolving and understanding a problem must be done with information at an equal or higher resolution than the frequency of the problem.

Analytical use of process history involves longer time horizons, encompassing compliance reporting, production summaries, optimization studies, cause and effect analysis, and many other requirements placed on the historian. Due to this it becomes necessary to keep the historical data intact for longer periods, typically for years, with some industries and/or regulations requiring no expiration of data. Analytical uses could involve process validation for recalled products, accident investigation, or training. Requirements placed on the historian could involve handling very large data sets. Analytical analysis over longer time horizons might be facilitated by statistically summarizing high-fidelity data into more manageable time frames, such as 15 minute, hourly, daily, shift, weekly, and monthly.

Traditionally operational and analytical roles have been tasked to the same historian and this historian was required to serve essentially two masters. The two roles, SCADA (supervisory control and data acquisition) or Plant operations personnel and the business or engineering personnel, require access to a process historian to support their needs. To further complicate the situation, these roles are in many instances located in different locations of the organization and typically members of different domains with separate user communities. In some cases they are located in external organizations accessing the historian via public infrastructure and all have legitimate uses of the historian.

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Generally, to enable these users, a single historian is set up and access is then granted through the entire network and firewall infrastructure to allow these users to get the information they require. One historian is commonly used for many legitimate reasons, including:

- Historians were an expensive and complex asset to install and maintain
- Duplicating Historians meant very often doubling the costs
- Historians pulled their data from the process control system and sensors so they had to be allowed access through externally open firewalls

3. Next Generation Historians from Invensys

Invensys Operations Management has implemented historian products that allow a different approach to solving problems related to secure data access across the enterprise and domain isolation. The Wonderware Historian is now available in four editions, which can be combined to provide a unique solution for getting information to a diverse user community. Each edition of the historian is identical in capability except for the following three metrics:

- Number of data values to retrieve information
- Length of time for the retrieval
- Ability to consolidate data from other historians

The four editions of the Wonderware Historian are:

(1) A Free Historian running on SQL Server Express

- 32 retrievable tags
- 7 Days from current time
- Unlimited Store forward to Enterprise Historian

(2) A Local Historian running on SQL Server Express or Standard Edition

- 25,000 retrievable tags
- 7 Days from current time
- Unlimited Store forward to Enterprise Historian

(3) A Standard Historian running on SQL Server Express or Standard Edition

- 100 to 100,000 retrievable tags
- Unlimited retrieval from current time
- Unlimited Store forward to Enterprise Historian

(4) An Enterprise Historian running on SQL Server Standard Edition

- Up to 500,000 retrievable tags
- Unlimited retrieval from current time
- Able to consolidate multiple Historians of any edition

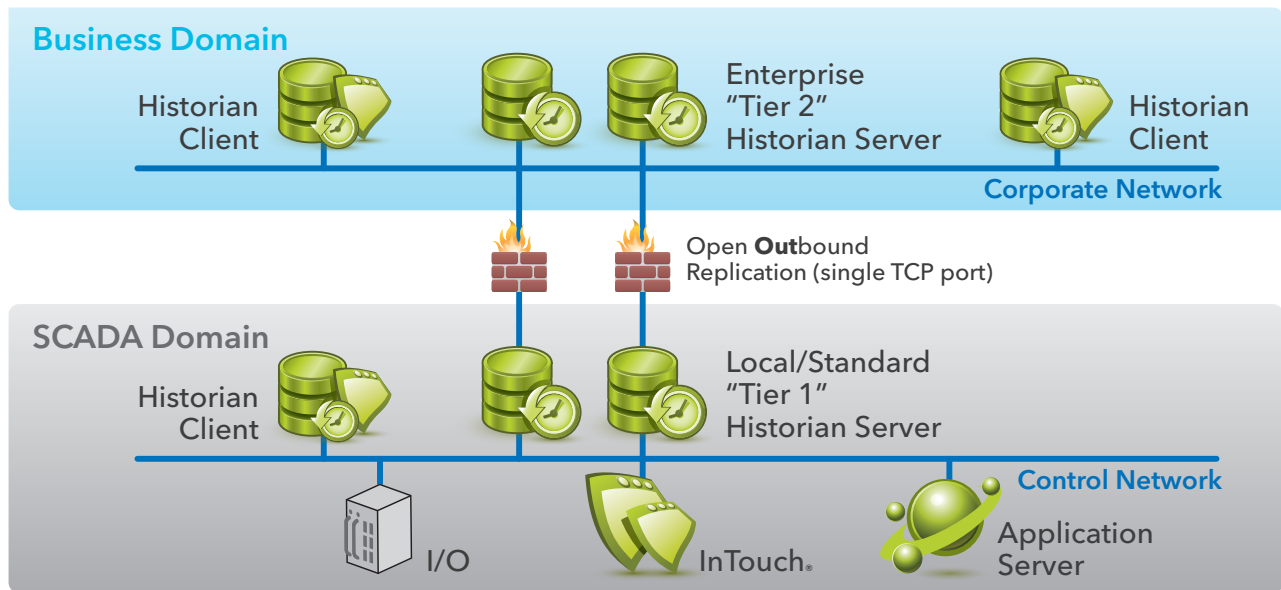
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4. How Domain Isolation is Achieved

All four editions of Wonderware Historian can now be combined to provide unique solutions to solve your historical data management problems. There are important considerations to understand with this approach. Data and configuration is delivered from the transmitting historian to the receiving historian. The data path is established via a single, user-configured TCP port (an outgoing port), which can only be established from inside the firewall. These two historians do not need to have any shared membership within their respective domains. There is no requirement to trust the domains between the Control and the Corporate networks. Each historian can reside within its own network and there is no requirement to install them within a DMZ. A Historian can be configured to deliver its data to multiple receiving historians with unique tag sets and fidelity for each one. Each transmitting historian can also be configured to automatically add any new tags created within it to the replication schedule being transmitted to the receiving historian. In this way all configuration tasks can be automated to keep the data model between the historians synchronized.

Historian to Historian communication is designed to handle very low speed, high latency, and intermittent network infrastructures. Redundancy can be accomplished by simply adding a second historian of any edition to the layer requiring it. This partner or redundant historian can also be remotely located from its partner since communication infrastructure is not required between the two historians. The Historian Client tools will also recognize this redundancy and automatically switch between the two partner historians. All data transmitted to the receiving historian is also presented via a Data Access Server (DAS) on the historian. This provides a real-time (read-only) data stream, which can be subsequently used by SCADA systems for process visualization and alarming, and is completely isolated from the SCADA network without any shared credentials or physical access.



Historian Server Pairing for secure, highly available data and domain isolation

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Given the design possibilities of these historian architectures, a strategy of 'Domain Isolation' can truly be implemented between the SCADA and Business Domains. Each can be enabled with their own Active Directory Servers (ADS) with no shared credentials existing between the two or more than two, if required. The Historian within the SCADA Domain is responsible for connecting to the Enterprise Historian in the Business Domain. It does this via a Windows Communication Foundation (WCF) service that requires a single, user-configured outgoing port on the firewall protecting the SCADA Domain. The Enterprise Historian has no knowledge of the credentials required to connect to the SCADA historian(s). Configuration is maintained from the SCADA environment as to which data to send and the tag configuration required. While no shared credentials or domain trusts need to exist between the networks, the Business domain has access to full fidelity, real-time data in a completely read-only mode. The workload of using historical data for detailed reporting and process analysis of the business uses will have no effect on the performance of the SCADA network. The data delivery between these networks can be encrypted to allow secure transmission through public infrastructure to Cloud environments or even directly to external organizations.

All this is now available with the Wonderware Historian as a part of System Platform from Invensys Operations Management. These scenarios are extremely cost effective and easy to setup and maintain.

5. Summary

Companies today face multiple challenges when it comes to providing users with the access to the mission-critical data, in the right context, at the right time. This is of paramount significance since companies have different sets of users at different levels—operational users at the control layer and the business or analytical users at the corporate layer of the business—with very different priorities.

Next generation Historians from Wonderware can help address historical data management challenges by enabling domain isolation of the Control Network from the Corporate Network. This can help improve historical data access and analysis while reducing costs.



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