Considerations for Integrating Historian Tools and Industrial Human Machine Interface (HMI)

by Jim Frider

Executive summary

Operations personnel who work in industrial facilities often find it difficult to access the detailed data they need to solve important process problems. Operators with access to real-time data streaming in from control and automation systems often struggle to understand the problems they are observing. Tools called historians address these issues by providing a complete process history for enhanced troubleshooting and analysis. This paper reviews the benefits of integrating historians with Human Machine Interface (HMI) applications that help control key industrial processes.

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Introduction

Capturing and storing process data from industrial sites is often executed on a haphazard basis. When an issue arises, a complete process history to help troubleshoot the issue is often not available. As a result, the operator is less effective and the ability to improve the process is difficult.

Process data historians are tools that both capture and store data coming from Human Machine Interface (HMI) systems and that fill gaps in the process history archive. Historians act as specialized database applications tailored for capturing data from high speed industrial processes.

The major benefits of historian tools include:

- Rapid problem resolution
- Identification of improvement opportunities
- Documentation and management of regulatory requirement information

Compared to typical relational databases, historians are better suited for industrial applications. They are designed to address the following unique characteristics of industrial environments:

1. **Higher than average data volumes** – Modern control / supervisory systems generate huge volumes of data; several months of data can easily reach hundreds of gigabytes.
2. **Higher data storage rates** – Tens of thousands of data values per second are common in industrial environments and are beyond the abilities of common relational database systems.
3. **Time series data** – Continuous physical properties such flows and temperatures are measured periodically over time. Storing and retrieving this type of data is not easily accomplished by relational databases.

Historians are scalable and are available for every type and size of industrial process and can collect data from the smallest, single machine or process up to an entire plant or multi-site global enterprise. Some historians allow for “tiering”. At “tier 1”, lower level historians collect data at the local level. Data is made available to operations personnel at this level. This tier 1 data can be sent to a higher level “tier 2” historian for archiving (see **Figure 1**). At this level the information can be automatically summarized for easier analysis by management.

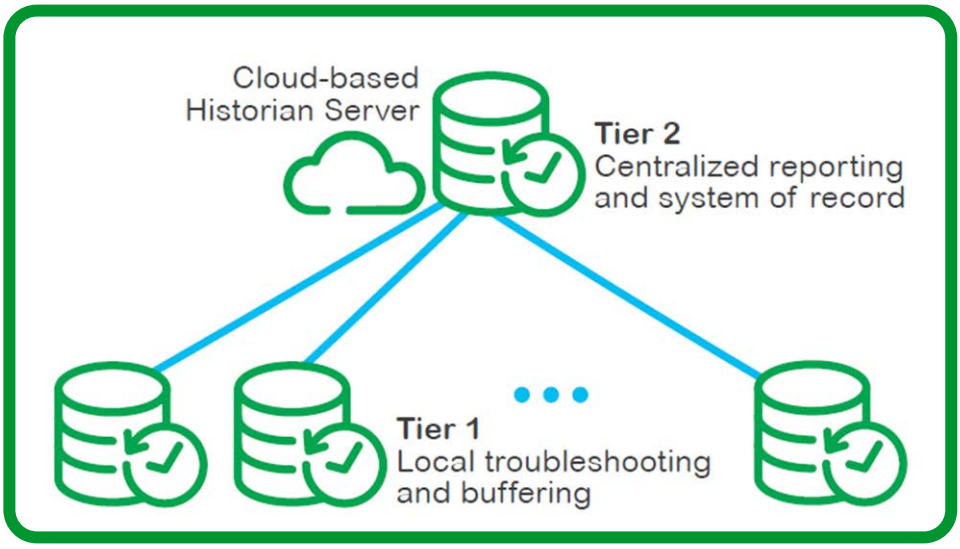

Figure 1
General schematic of a 2- tier historian tool

Essential elements

In addition to scalability, other practical considerations for evaluating historian tools include connectivity, ease of installation / configuration, and integration into both workflow and backup and recovery planning.

Historians that are integrated with HMI systems, allow for the capture of data on HMI displayed parameters. Historians offer, to varying degrees, connectivity to third party data sources and compliance with open connectivity standards (OPC). The more tightly integrated historians leverage the strengths of the HMIs and therefore save significant configuration time by reducing the risk of configuration errors.

Some historians are designed to “store and forward” data coming from their data sources if the primary data communication network goes down. Once communications are re-established, data is forwarded to the historian so no process history is lost. The integration of historian solutions with popular virtualization platforms is another way of assuring that data is highly available in a disaster recovery scenario. Duplicate historians can also be located in physically separated facilities to ensure data integrity.

Operations personnel require data analysis trending, data visualization and reporting tools to convert historian data into actionable information. Web based versions of these tools provide the reporting required and allow users easy access to the full range of plant information. Mobile devices allow operations personnel to stay fully informed on plant performance. Reports from historians can be pushed to their smart phones and tablets (see **Figure 2**). Analytics software can also be used by engineers and corporate management to perform more in-depth process analysis and to generate performance dashboards.

Figure 2
Historian analytics information can be accessed from tablets and other mobile devices

In order to track the work activities related to a problem discovered after viewing historian data, workflow management applications can integrate with HMIs, historians, and manufacturing execution systems (MES) and can link to notification systems such as instant messaging (SMS), and email. Each work task can be tracked so that management has a record of which particular tasks were performed and when those tasks were executed. This type of precise tracking is particularly important when addressing regulatory or safety issues.

Historians can sometimes be installed on the same computer as the HMI solution. Most often, however, a historian is installed on a separate server for performance and reliability reasons. **Figure 3** illustrates an example of a large multisite historian configuration.

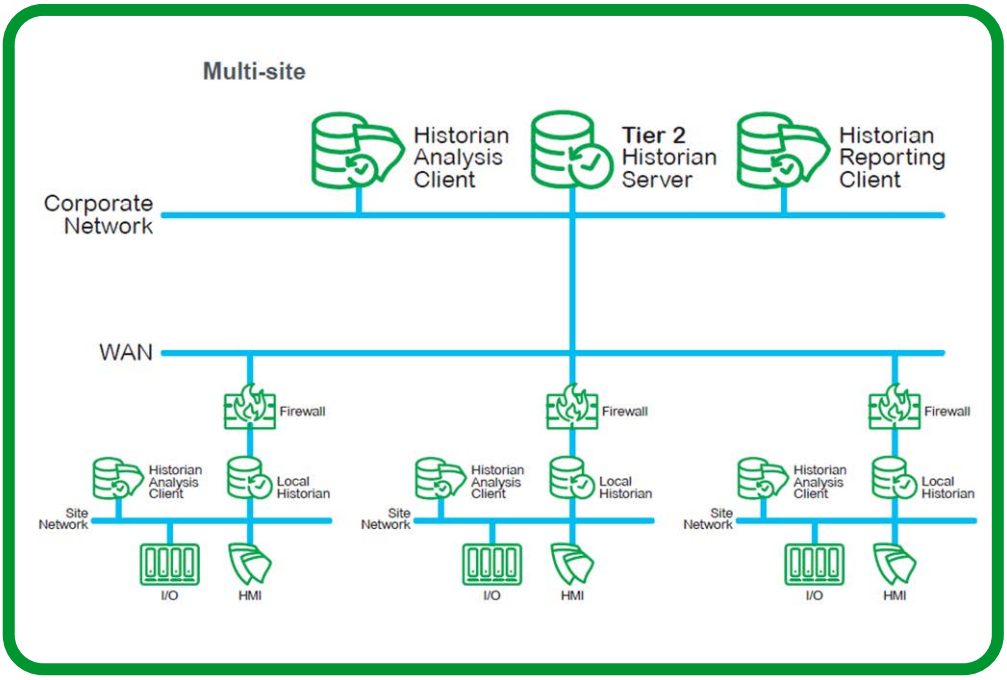

Figure 3
Multi site historian configuration

Conclusion

The ability to assemble a complete process history helps industrial enterprises to minimize cost, maximize productivity, reduce waste, and maintain high levels of safety and environmental compliance. Historians are software tools that can be added to any HMI application to provide a complete process history for later troubleshooting and analysis. These tools are highly scalable, secure, and can provide useful information to operations personnel through a broad selection of desktop and mobile reporting and analysis clients.

Organizations wishing to initiate a migration to a historian-enabled environment should consider the following short and long term steps:

Within the next few weeks: Assess what steps need to be taken in order to evaluate those historian tools that are specialized to the needs of industrial sites.

Within the next 6 months: Determine which HMI-driven processes would be the simplest to implement in a pilot environment.

Within the next year: Enlist a trusted partner with expertise in both industrial architectures, human machine interfaces (HMI), and process control to help maximize operational efficiencies.

About the author

Jim Frider is Product Marketing Manager, Information Products, at Schneider Electric. He holds a bachelor's degree in Electrical Engineering from the University of Minnesota. He has published multiple magazine and journal articles and white papers on industrial information management.