



Build Better SCADA, Historian & MES Solutions with Edge Computing

Proficy 2023

- iFIX
- CIMPLICITY
- Historian
- Plant Applications
- Operations Hub

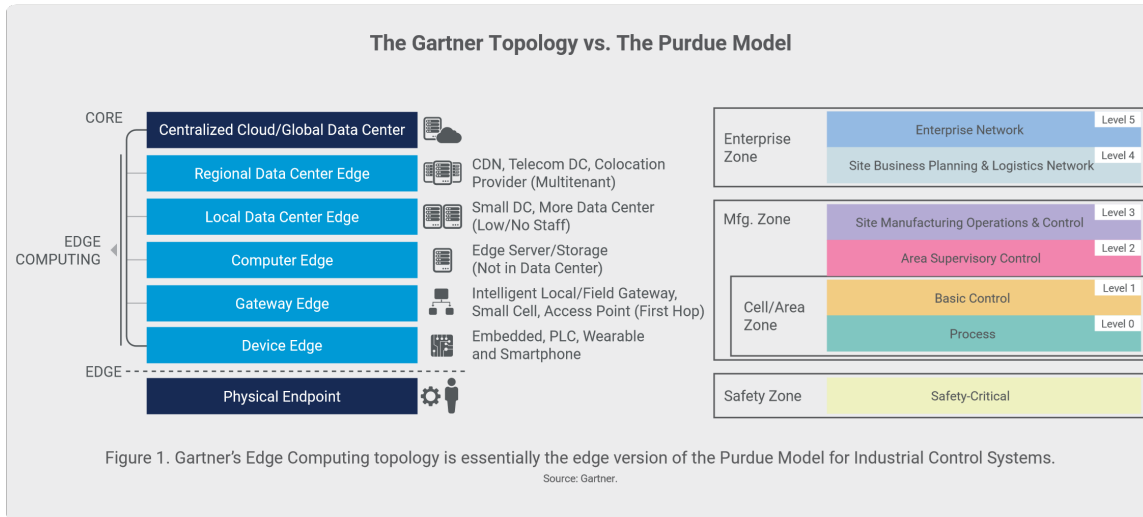
Running mission critical SCADA, Historian and MES software on conventional compute platforms is no longer the best way to keep them running optimally! Stratus platforms coupled with GE Software is the EASY button.



Introduction

Traditional human-machine interface (HMI) and supervisory control and data acquisition (SCADA) architectures for mission-critical automation control have served industry well, but there is always room for improvement. With digitalization comes an edge-computing-based approach that redefines what “good” looks like in a monitoring and control system architecture.

Modern Edge Computing platforms solve many common challenges faced by engineers when deploying or operating HMI and SCADA in their automation and control systems. This paper describes what an improved and fortified industrial control system architecture looks like; the inherent advantages of Edge Computing for resolving persistent challenges; and proof points from a wastewater facility, pharmaceutical OEM, and an educational research facility whose control systems are benefitting from the transition to a single edge platform.



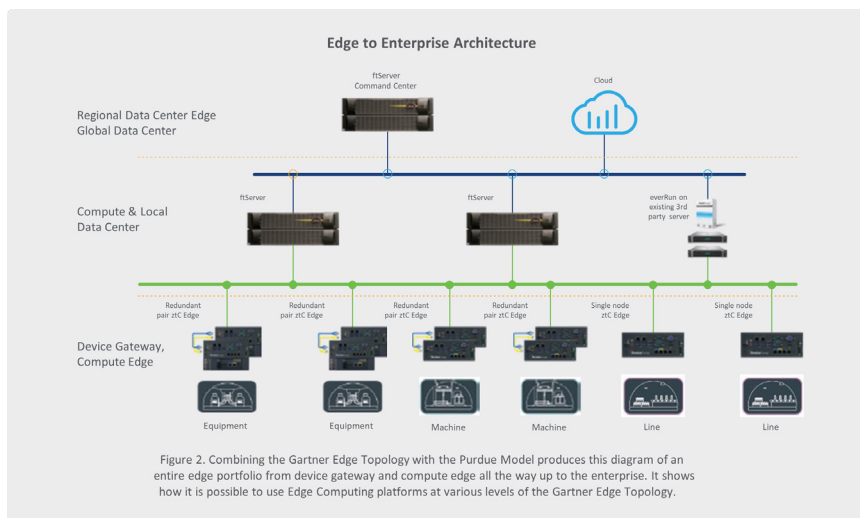
You'll also see how three different organizations implemented an Edge Computing control and automation architecture along with a modern distributed control system (DCS) and historian software for process optimization.

Visualizing the Opportunity

Edge Computing is a distributed computing framework that collects, processes, and stores crucial information close to the edge — where it is produced or consumed — rather than in a centralized server or data center. But what does that mean for an industrial control system infrastructure?

Figure 1 reflects how Gartner's representation of an Edge Computing topology is essentially the edge version of the Purdue Model for Industrial Control Systems. Figure 2 combines the two models to illustrate a complete edge portfolio, from the device gateway to compute edge to the enterprise.

Adopting Edge Computing within your enterprise benefits automation control, specifically HMI and SCADA design, by improving your ability to protect mission-critical operations. A single edge platform can bolster operational excellence to deliver extensive engineering, operation, and maintenance efficiencies as well as critical reliability, safety, and security improvements.



Solving the Challenges

One of the most pressing challenges with typical automation and control architectures is turning the sheer volume of data generated by today's industrial automation systems into actionable information. Other significant challenges include modernizing legacy infrastructure, streamlining operations by reducing disparate islands of automation, and eliminating unplanned downtime. The Edge Computing approach tackles these challenges by design.

Continuously available computing modernizes the infrastructure and streamlines operations by enabling the consolidation of multiple software solutions running on multiple individual computers into a single platform. Further, with GE's 2023 Proficy software release, configuration and maintenance of disparate SCADA, Historian and other platforms, is a thing of the past. GE's Configuration Hub offers a modern browser-based configuration interface as an alternative to traditional thick-client applications.

A typical Industrial control system installation might have HMI/SCADA software or advanced applications such as historians, manufacturing execution systems (MESs), batch, asset performance, engineering, and programming software typically installed on multiple computers. Stratus Continuously available systems offer built-in virtualization. Combined with GE's Configuration Hub software, engineers, integrators, and end users can avoid complexity and related setup and configuration costs.

In addition to embracing digitalization, decreasing islands of automation, and facilitating workload consolidation, edge platforms offer additional performance benefits such as mitigating delays from bandwidth and latency issues and simplifying maintenance complexities common with an expanding pool of hardware and software assets. Edge platforms that support remote and autonomous operations enable OT users to manage systems, removing the need to rely on IT resources.

As more critical applications reside in edge platforms, built-in redundancy to protect against unplanned downtime and enable operational resilience increases in importance. Downsizing to a single redundant device where all the valuable automation and control software are installed actually increases reliability and simplifies security management, thus minimizing the risk of costly operational disruptions. Built-in redundancy and preconfigured virtualization are especially important when the SCADA or Historian is installed in a remote or hazardous environment.

Delivering Additional Capabilities

Some modern Edge Computing platforms are industrial grade, such as those provided by Stratus. Ruggedized, Class I Division 2 (CID2) certified platforms, such as Stratus' ztC™ Edge Computing platform (see Figure 3), can be installed in hazardous locations, together with the programmable logic controllers (PLCs), in the same control panel without special accommodations for temperature, humidity, or vibration protection. Many Edge Computing devices have built-in protection from cyberattacks, such as:

- Host-based firewalls for blacklisting or whitelisting IP addresses or domain names
- Restricted USB ports to help prevent the spread of malware
- Role-based access controls to authorize specific users and groups
- Secure communications protocols and Trusted Boot to thwart cyberattacks

Scalability, extensibility, and standardization also are associated with advanced edge platforms, such as the smaller-capacity Stratus ztC Edge and large-capacity Stratus ftServer® platforms (see Figure 4).



Figure 3. Some modern Edge Computing platforms are industrial grade, such as the ruggedized, Class I Division 2 (CID2) certified Stratus ztC Edge Computing platform, which can be installed in hazardous locations, with the PLCs, in the same control panel without special accommodations for temperature, humidity or vibration protection.



Figure 4. Advanced edge platforms, such as the Stratus ftServer platform, provide scalability, extensibility and standardization. The best Edge Computing platforms scale well as new nodes and locations are added.

The best Edge Computing platforms scale well as new nodes and locations are added. They are extendable to accommodate new operations and control capabilities without a significant investment, and flexible to extend monitoring and control of the plant to mobile devices. They also support standardization of all control into a single architecture and can meet non-redundant, high availability, or fault-tolerant needs. And the best edge platform can be easily installed, operated, and maintained by non-IT personnel.

Proof is in the pudding – Three Case Studies

The following three companies, each with unique needs, found their solution in an Edge Computing control and automation architecture. See how they optimized their operations.

1. Customer Issues #1 – Legacy System

- Problem - Western NC wastewater processor had an older SCADA system that was becoming hard to maintain.
 - o Running real server hardware for SCADAs that was obsolete.
 - o Had real PC clients around the facility that could take days to replace if they failed.
 - o Had no central way to manage operator clients.
- Actions taken
 - o Worked to define the current system and built a transition plan.
 - o Setup a Stratus 2910 with VMware and 9 virtual machines.
 - o Combined two SCADA systems into one GE HMI/SCADA application.
 - o Implemented ThinManager with Arista Thin clients.
- Results
 - o Stratus assures near zero unplanned hardware downtime.
 - o System changes can be made centrally.
 - o New additions can be made easily with just a license changes and little software – if any needs to be installed.
 - o Operator Clients can be replaced in minutes – not hours or days.



Using Stratus, we have built smart plants that are managed remotely by Artificial Intelligence and visible from any location 24/7.

2. Customer Issues #2

- Problem - Freeze Dryer OEM solves reliability problems for pharmaceutical manufacturers.
 - o Failed batches due to data loss, though rare, could mean \$1M to \$5M in wasted product.
 - o Unplanned hardware failures.
 - o No plans for disaster recovery.
- Actions taken
 - o Helped customers devise a plan for reliability.
 - o Included Stratus FT server (2910/4910/6910) with VMware.
 - o Support for systems with 2 to 10 VMS, 1 client to 20 clients.
- Results
 - o OEM offering a fault-tolerant solution.
 - o Consolidated 21 CFR Part 11 planning with reduced hardware footprint.
 - o Total average customer reliability score >99.999%.

3. Customer Issues #3

- Problem - Northeast US Higher Education Research Facility needs absolute uptime for Life Safety System.
 - o Life Safety System (LSS) implemented on traditional PC Server architecture.
 - o Failure could mean death or severe injury to research personnel.
- Actions taken
 - o Stratus FT server 4910 with GE SCADA software.
 - o Implemented Stratus proactive system monitoring (ASN) for immediate notification of problems.
- Results
 - o All Toxic Gas Monitoring System (TGMS) equipment virtualized for easier disaster recovery.
 - o Unplanned downtime reduced to effectively zero.
 - o Guaranteed alarm notification in the event a leak is detected.
 - o Safer environment with significant risk reduction and lower liability profile.



Some of the most pressing challenges with typical automation and control architectures include demand for digitalization, disparate islands of automation, and downtime. The Edge Computing approach coupled with GE's common software configuration approach tackles these challenges by design.

Summary

The breadth and depth of proven Edge Computing advantages underscore the reasons it is time to turn the page on traditional automation control architectures. For mission-critical operations, leveraging benefits such as work consolidation, operational resilience, downtime protection, and standardization ensures a more powerful, efficient, and secure HMI/SCADA solution.

About Stratus Technologies

For leaders digitally transforming their operations in order to drive predictable, peak performance with minimal risk, Stratus ensures the continuous availability of business-critical applications by delivering zero-touch Edge Computing platforms that are simple to deploy and maintain, protected from interruptions and threats, and autonomous. For 40 years, we have provided reliable and redundant zero-touch computing, enabling global Fortune 500 companies and small-to-medium sized businesses to securely and remotely turn data into actionable intelligence at the Edge, cloud and data center – driving uptime and efficiency.

About GE Digital Manufacturing

GE Digital is a subsidiary of the American multinational conglomerate corporation General Electric. Headquartered in San Ramon, California, the company provides software and industrial internet of things (IIoT) services to industrial companies.

GE Digital's primary focus is to provide industrial software and services in four markets:

- Manufacturing applications serving discrete and process industries, as well as water utilities and economy-scale digital transformation projects[1]
- Electric and Telecommunications Utilities
- Oil & Gas industry and related adjacent markets (petrochemicals, chemicals manufacturing)[2]
- Power generation (gas, steam, solar, wind, hydro and related balance of plant operations and service support)

About AutomaTech

AutomaTech is a leading Industrial Automation Distributor of technology solutions focused on improving operational performance. Specifically, we have experts in connecting, controlling, visualizing, analyzing and optimizing industrial and critical systems. Our product offering includes a flexible and scalable mix of hardware and software solutions (including Stratus Solutions and GE Digital Software).

AutomaTech professional services experts are available get your fault tolerant, virtualization solution up and running quickly and to support your application requirements. Jumpstart services for ESX Server, virtualization design and virtualization deployment include:

- ftServer Hardware & Software Installation and Configuration
- Virtualization Assessment, Design and Implementation
- System Maintenance and Fault Tolerant Training
- AutomaTech Software Installation, Licensing, and Configuration
- Additional Services Available:
 - o All Toxic Gas Monitoring System (TGMS) equipment virtualized for easier disaster recovery.
 - o Unplanned downtime reduced to effectively zero.

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