



Industrial System Consolidation in Action

As automation expands in the smart factory, companies are consolidating discrete workloads, including process control, visualization, and data acquisition, onto a single system. Such a move helps reduce capital outlay and footprint, and lower operational expenses for power, cooling, and management. It can also deliver greater security by reducing system-to-system communications.

Maximize efficiency with system consolidation

Intel provides the hardware building blocks to consolidate systems, along with an application-ready platform that enables developers to speed development of virtualized, real-time systems.

Intel® Core™ processors provide fast throughput with features like Intel® Hyper-Threading Technology,¹ allowing each processor core to work on two tasks simultaneously.

Intel® Turbo Boost Technology¹ increases processor speed when additional processing performance is required.

Intel® Virtualization Technology¹ provides a fast, secure infrastructure for virtualized systems, improving the flexibility and robustness of software-based virtualization.

Intel Core processors with Intel® vPro™ technology² support remote management through Intel® Active Management Technology, enabling users to manage, repair, and protect the computing infrastructure remotely.

Intel® Industrial Solutions System Consolidation Series offers a pre-integrated, pre-validated application-ready platform to speed the development and deployment of virtualized, real-time systems. For solution developers, this can mean significantly lower upfront engineering costs, shorter product development cycles, and faster time to market.

Read the success stories

To see what consolidation can mean, take a look at the three case studies that follow to learn how Dell, Baosight, and Pentamaster have used system consolidation to benefit their business.

[intel.com/industrialconsolidation](https://www.intel.com/industrialconsolidation)

System Consolidation In Action: Making Virtualization a Reality in Industrial Settings

Emerson Process Management used Intel® technology-based Dell platforms to bring virtualization—and system consolidation—to their customers.



Who: Dell OEM Group and Emerson Process Management



What: Emerson's DeltaV* virtualization solution harnesses the Dell PowerEdge* VRTX shared infrastructure platform with Intel® Xeon® processor server nodes and Intel® Virtualization Technology (Intel® VT) to bring virtualization to industrial environments



Why: The virtualized system enables consolidation and delivers proven cost savings and reduced latency, yet is quick and easy to implement and manage

More: Read the complete Dell PowerEdge VRTX case study [here](#).

CHALLENGE:

Delivering Virtualization to the Industrial Environment

Datacenters and enterprise customers have long benefited from virtualization, but industrial environments have been slow to adopt the technology, citing concerns about latency and system reliability. On the factory floor, unplanned downtime can cost millions, and manufacturers are concerned with keeping production simple and uninterrupted.

In an effort to help industrial solution providers like Emerson bring the cost savings and high availability of virtualized, consolidated systems to their customers, Dell developed a solution that would overcome these concerns:

Latency. Latency impacts industrial process automation by slowing operations with compute or network delays.

Downtime. Whether a planned upgrade or an unplanned interruption, downtime represents a significant cost in industrial settings. As a result, manufacturers tend to put off software and system updates until they need to replace the hardware.

Complexity and cost. Complex systems require additional time to deploy and maintain, increasing operational expenditures for ongoing management.

SOLUTION:

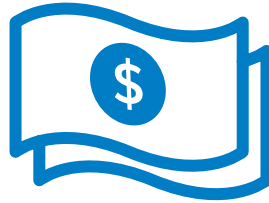
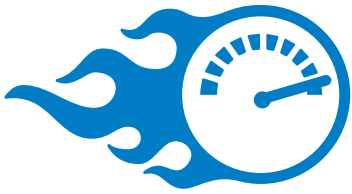
The Emerson DeltaV* Digital Automation System Brings Virtualization Designed for Industry

Combining the Dell PowerEdge VRTX using Intel Xeon processors and their custom virtualization solutions, Emerson delivered the DeltaV Digital Automation System specifically for virtualization of industrial process control. The solution integrates servers, storage, networking, and management, enabling manufacturing facilities to quickly deploy a virtualized infrastructure. The consolidated system can run multiple operating systems simultaneously on a single platform, so new and legacy software can run together on a system that shares network, storage, and other resources to further reduce costs. And low-latency Intel Virtualization Technology (Intel VT) helps speed the system, overcoming processing overhead and latency issues inherent in virtualization hypervisors.

Fast processing. Intel Xeon processors on up to four compute nodes coupled with Intel VT means the consolidated system can easily deliver the dense, high-performance processing required without latency issues. This is aided by Intel® APIC virtualization technology, which offloads interrupt management from the hypervisor.

Reliable uptime. The Dell PowerEdge VRTX reduces downtime with high-availability features such as RAID and redundant components. And virtualization technology allows industrial customers to easily update operating systems and software without interruption, and without waiting to replace the hardware.

Ease of use and lower costs. A consolidated system with shared storage and other resources reduces complexity by requiring fewer hardware components and cables. It also reduces costs associated with power and cooling, and is easy to manage and maintain.



The Dell PowerEdge
VRTX process
automation solution
delivers the edge that
industrial solution
providers need to
compete in today's
market.*

RESULT:

**Faster Time to Market for Reliable Industrial Systems,
Lowering Cost, Complexity**

Through an integrated virtualization solution tailored to process automation, Emerson, Dell, and Intel are accelerating the time to market for virtualized, consolidated systems in industrial settings. Not only does the solution lower costs, it allows manufacturers to continue running important legacy software, even while keeping their hardware up to current standards and supporting newer software investments. The result is a process automation solution that delivers greater uptime, more speed, and the edge that industrial environments need to compete in today's market.

System Consolidation Solutions from Intel and Dell

Consolidating systems is not a new concept, but it is relatively new in the industrial setting, due in part to perceived risks associated with virtualization. Dell OEM developed the PowerEdge VRTX solution with their industrial customers in mind. This easy-to-use integrated system addresses concerns about speed with Intel Xeon processors. Customer concerns about latency are addressed by Intel Virtualization Technology with Intel APIC virtualization technology. The virtualized PowerEdge VRTX allows customers to run multiple operating systems on a single system, which means software upgrades can happen any time, with no downtime; making it a system that industrial customers can integrate at any time—even if they need to run legacy software. Dell OEM is a Premier member of the Intel® Internet of Things Solutions Alliance, which provides collaboration and access to the latest Intel® technologies.

Learn More

Contact your Intel sales representative for more information, and learn more about system consolidation using multicore Intel® processors and Intel VT at intel.com/industrialconsolidation

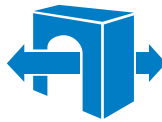
Read the complete Dell PowerEdge VRTX case study [here](#).

System Consolidation In Action: Secure, Virtualized Industrial Gateway

Consolidating critical data workloads improves secure communication efficiency, helps Baosight create new market opportunities



Who: Shanghai Baosight Software Co., Ltd



What: iCentroGate-GAP* secure gateway using system consolidation for unidirectional communication of sensitive data



Why: Virtualized solution reduces costs and strengthens data transmission security

More: Read the complete Baosight case study [here](#).

CHALLENGE:

Add Industrial Intelligence While Keeping Data Safe

Industrial intelligence is an exploding opportunity made possible by the Internet of Things, and is key to reducing operating costs and improving competitiveness. To gain industrial intelligence, utilities, manufacturers, and other industrial environments must securely collect and transmit growing volumes of data for analysis. Typically, data acquisition and transmission is accomplished with two separate systems, opening infrastructure to considerable risk:

Data vulnerability. Sensitive industrial data may be subjected to security risks as it is transferred between discrete systems.

Financial burden. Using separate systems for data acquisition and delivery adds to cooling, power, and maintenance costs.

Management complexity. Multiple systems adds layers of complexity with cabling, shielding, and networking.

SOLUTION:

Baosight iCentroGate-GAP* Gateway Keeps Data Safe with Consolidation

The iCentroGate-GAP gateway product from Shanghai Baosight Software Co, Ltd. is a consolidated system that provides data acquisition and secure intranet-to-internet data transfer in industrial settings. While gateway systems are not unique, iCentroGate-GAP stands out in the market by bringing a sharpened focus to security. The quad-core processor-based system uses virtual machines on two dedicated processor cores. This yields the compute power and fast throughput needed for secure unidirectional transfers of data between the two separate operating systems to replace conventional communication with more secure intercore communication.

Secure and trusted data. Unidirectional intercore communication helps protect sensitive industrial data from cyber-attacks.

Cost savings. A consolidated system delivers the benefits of multiple systems in a single footprint, resulting in lower operational costs.

Simplified management. Consolidated systems often have a better mean time between failures (MTBF) with fewer components to fail.



“Our ability to deliver unidirectional data communication for sensitive data flows makes Intel’s solution the right choice for our secure GAP product.”

Dong Wensheng,
General Manager of R&D, Baosight

RESULT:
Trusted Data and Lower Costs with a Consolidated Gateway

The consolidated iCentroGate-GAP gateway provides a unique and innovative solution to Baosight’s customers. Consolidating data acquisition and transfer into a single system gives users in industrial environments secure access to data for manufacturing and business intelligence via unidirectional, intracore communication. At the same time, this reduces operating expense, system footprint, energy consumption, and integration and support efforts.¹

Intel® Industrial Solutions System Consolidation Series

System consolidation brings with it many benefits, from reducing capital outlay and footprint, to lowering operational expenses for power, cooling, management, and more. Baosight used the Intel® Industrial Solutions System Consolidation Series to quickly and efficiently implement their virtualized gateway. The quad-core platform hosts two virtualized RTOSs and one embedded operating system to support multiple unique workloads on a single computing system. Products in the series are ready to use right out-of-the-box, providing pre-integrated, validated, and tested key software and hardware components in a single, easily managed system. For solution developers like Baosight, this can mean significantly lower upfront engineering costs, shorter product development cycles, and faster time to market. For industrial customers, the result is lower cost and reduced complexity through the consolidation of computing devices for important functions into a more streamlined solution—from data acquisition and transfer as in the case with Baosight, to motion control, PLC, HMI, machine vision, data acquisition, safety, and more.

Learn More

Contact your Intel sales representative for more information, and learn more about the Intel Industrial Solutions System Consolidation Series at intel.com/industrialconsolidation

Read the complete Baosight case study [here](#).

1. Results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance

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System Consolidation In Action: Powerful Vision System for Real-time Analysis

Consolidating image analysis systems
greatly speeds vision solution



Who: Pentamaster Corporation Berhad



What: A unique latex glove reprocessing system employs real-time vision analysis from eight cameras to enable glove reuse and reduce consumption up to 70 percent. Pentamaster consolidated the computers in the solution into two systems – down from four



Why: The consolidated solution saves on overall system cost and provides needed processing headroom for advanced vision processing and real-time vision analysis.

More: Read the complete Pentamaster case study [here](#).

CHALLENGE:

Vision-system Bottleneck

Pentamaster's GURU (Glove Unique Reprocessing Unit) employs compute-intensive real-time vision processing to make safe reuse of latex gloves possible, ensuring they are sound, sanitizing them, and tracking their reuse. This not only eases the environmental impact, but reduces the cost for gloves borne by users. The original GURU system used four Industrial PCs (IPCs) with eight high-definition cameras that provided real-time vision analysis of the gloves. The GURU system faced several challenges:

Real-time speed and performance. Vision processing demands the computing performance and speed to provide real-time capability without disrupting other parts of the system.

Camera support. Four computers—each with their own power, cooling, and maintenance needs—supported the eight cameras used in the system.

Technology roadmap. GURU's underlying technology framework may not have been able to support newer technologies, which could impact the ability for the product to meet market demands and stay ahead of the competition.

SOLUTION:

Pentamaster GURU Optimizes Vision Processing with Consolidation

Pentamaster consolidated the IPCs in the GURU from four to two. Part of what made this possible was that the Intel® architecture-based IPCs were much more powerful than those they replaced, so they were able to provide full vision support for all eight HD cameras, including the processing requirements to perform complex algorithms on large image datasets. Not only did the system benefit from the exceptional processing speed of the Intel® Core™ i5 processors, they also delivered efficiency by using multiple cores and integrated graphics processing.

Fast vision processing. Integrated graphics and fast multicore processing allows the GURU to perform real-time image-processing tasks 1.5X faster.

Energy efficiency. A consolidated system delivers the same benefits of multiple systems, but with lower energy use and costs—a key interest to this environmentally conscious company.

Ready for the future. Consolidated systems with Intel Core processors support new vision processing capabilities as they become available.



“Previously, we needed four Industrial PCs (IPCs) to support the eight cameras in GURU. With the new processors, we only need two IPCs.”

Mr. You Chin Teik,
Product Development Manager, Pentamaster

**RESULT:
A Greener, 50 Percent Faster, and More
Competitive GURU**

By consolidating the vision processing modules in the GURU with Intel® technology, Pentamaster was able to greatly improve the speed, energy efficiency, and manageability of the system. The overall inspection cycle of GURU improved to less than 2 seconds, boosting output from 600 gloves per hour to 900. Not only does this give them a competitive edge, it enables them to more easily evolve the system in the future.

Pentamaster Wins with System Consolidation

System consolidation brings with it many benefits, from reducing capital outlay and footprint, to lowering operational expenses for power, cooling, management, and more. Intel® Core™ processors provide fast throughput in consolidated systems, with features like Intel® Hyper-Threading Technology¹ to allow each processor core to work on two tasks simultaneously, and Intel® Turbo Boost Technology to increase the processor speed when additional processing performance is required. Consolidating their GURU system with Intel Core processors allowed Pentamaster to increase not only the speed of their solution, but the processing performance. As a result, they doubled the number of cameras per computer in their consolidated solution, which not only results in a more efficient system, but costs less to operate.

Learn More

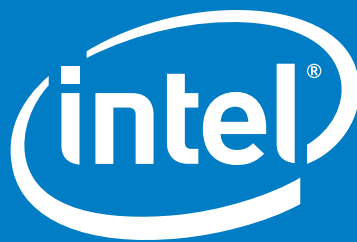
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Read the complete Pentamaster case study [here](#).

1. Intel® Turbo Boost Technology, Intel® Hyper-Threading Technology, and Intel® Virtualization Technology require a computer system with a processor, chipset, BIOS, enabling software and/or operating system, device drivers, and applications designed for these features. Performance will vary depending on your configuration. Contact your vendor for more information.

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2. Intel® vPro™ Technology is sophisticated and requires setup and configuration. Availability of features and results will depend upon the setup and configuration of your hardware, software, and IT environment. To learn more about the breadth of security features, visit <http://www.intel.com/technology/vpro>.

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