



Raising the Bar on Scalability

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Table of Contents

1. Introduction	2
2. The Challenge	2
3. Functional Scalability	2
4. Solution Scalability	3
5. Vertical Scalability	4
6. Horizontal Scalability	5
7. “Baked-in” Scalability	6
8. Summary	7

1. Introduction

The term Scalability has been so over-used in regard to systems that most users, integrators and decision makers are completely desensitized to its use. Those same individuals, however, care deeply about true scalability. Scalability is not merely starting small and growing big. There are many dimensions to consider and most are critical to true investment protection for the end user. This whitepaper will explore these dimensions of scalability and hopefully set a new expectation for scalability for system and software purchasing decisions in the future by “raising the bar” on scalability.

2. The Challenge

Automation and information systems represent a major investment for all businesses, large or small. Long-term protection of that investment is a significant consideration when selecting a partner and system. Though technology lifecycles may precipitate change, it is extremely important to be able to evolve solutions over time, expand them into previously unforeseen areas, and integrate them with other systems which may or may not already be in place. In many cases, it is also important to consider the ramifications of potential merger or acquisition activity and how systems may be affected by that eventuality. All the while, businesses must stay focused on protecting intellectual property, minimizing disruption to operations and doing so cost effectively. These requirements match system characteristics along dimensions of scalability, from small to large, one to many, current to future, simple to complex, single piece of equipment to entire enterprise. Meeting those requirements demands a level of architectural design of automation and information systems that is purposefully constructed to support scalability in all dimensions. Those kinds of demands cannot be met by “bolting on” interfaces, repeating expensive design work or rip-and-replace tactics. The result would be inadequate and unbearably costly. To meet that challenge, Wonderware’s parent company Invensys embarked on the development of ArcestrA technology, a software architecture designed to be inherently scalable in all meaningful dimensions. Wonderware software solutions leverage the powerful capabilities of ArcestrA technology, ensuring remarkable ease-of-use and scalability.

3. Functional Scalability

Traditional small projects involve low initial cost, low risk and short implementation time, all important characteristics. However, many small projects are difficult to functionally extend and very difficult to scale. In contrast, traditional large projects are more functionally complete and enjoy full-scale implementation, but they have much higher initial costs, require much longer implementation time, and carry much higher risk. Wouldn’t it be nice to start with a small implementation and grow to the size needed, when needed, with modest incremental effort and without increased risk? Traditionally, the underlying platform has been an enormous constraint; small systems simply have not provided the capabilities to grow into large systems without completely replacing the

underlying architecture (Figure 1). Wonderware breaks this tradition with a truly scalable System Platform built on the unique ArchestrA architecture, which effectively removes these constraints and enables a smooth evolution of the solution from small to as large as the business requires, without replacing the underlying technology. The plant model supports the gradual evolution of an application by permitting additional attributes and functionality to be added to the solution and deployed throughout the operation from any given development station.

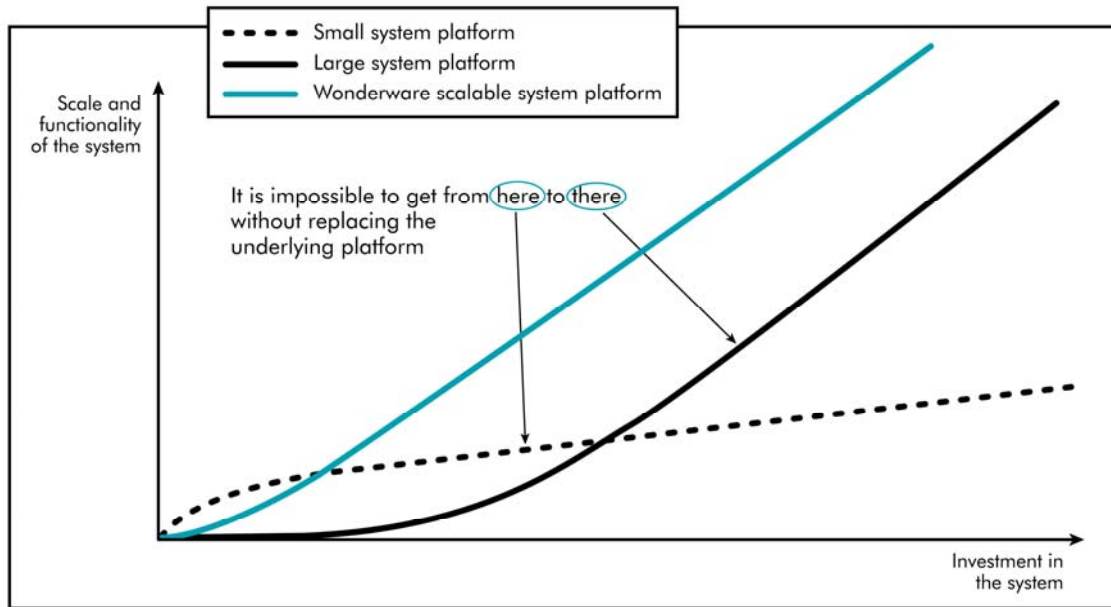


Figure 1 – The Challenge of Functional Scalability

4. Solution Scalability

Growing a system from small to large requires another dimension of scalability in addition to functionality. True scalability demands that a solution can be easily extended from a single, simple application — perhaps a single machine — to a comprehensive networked solution serving the needs of an entire multi-plant enterprise. What if it is necessary to have multiple supervisory applications that are different but have similar components, and that must be separate but benefit from each other's design? What if the applications must be able to operate, change and grow independently? This is a real-world scenario for which the ArchestrA architecture and the Wonderware System Platform were designed. Wonderware has combined the most powerful capabilities of object-oriented plant modeling, the world's favorite graphical HMI and unparalleled device integration capabilities. This provides maximum re-use of engineering where appropriate, with flexibility where required; common application logic with device-independence; consistent application visualization with security and application-specific detail; all of which can be deployed and managed from a centralized, standards-based environment.

5. Vertical Scalability

A supervisory system is just one part of an industrial operation, albeit a significant one. In the same way that each department in an enterprise needs to integrate and collaborate smoothly, supervisory systems need to integrate and enable collaboration with other systems in an enterprise. Effective solutions must be capable of efficient, scalable integration with enterprise-level systems such as ERP, Supply Chain Automation, Production Planning and other corporate systems for planning and reconciliation. Wonderware's strong commitment to standards — and continued active involvement in defining industry standards — means that integration and scalability are built into all of Wonderware's solutions. Standards such as XML, OPC® and SQL are complemented with Web Services and ISA-95/XML B2MML support (Figure 2).

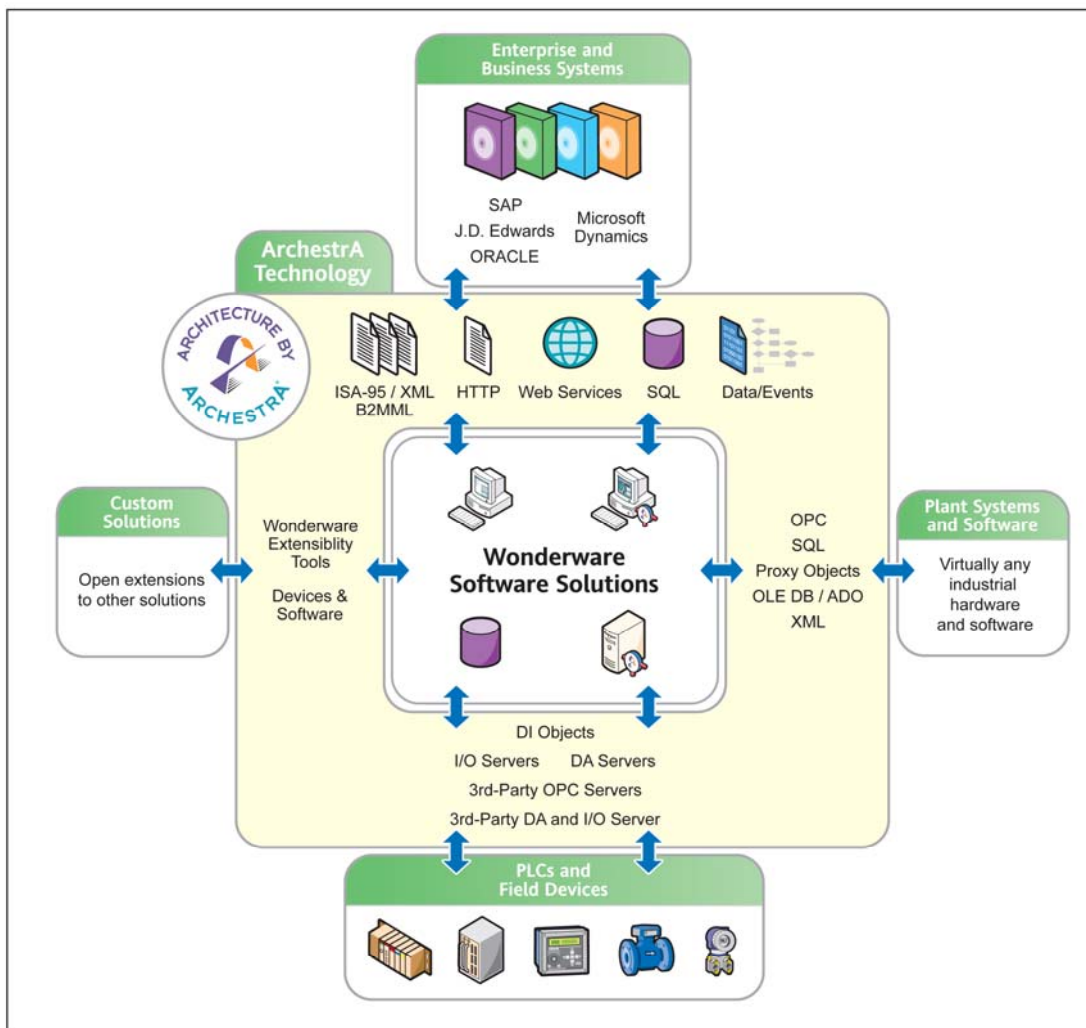


Figure 2 – Overview of a Scalable Connectivity and Software Integration Architecture

Wonderware extends the value of Supervisory HMI applications with a growing portfolio of powerful Production and Performance Management software solutions. Combined with the Wonderware System Platform, which is the basis for Supervisory and Production and Performance software solutions, Wonderware provides value right out of the box, for true vertical scalability today, tomorrow or whenever the business is ready to grow.

Vertical scalability also means scaling to the plethora of device connectivity requirements that exist. While today's supervisory systems may provide interfaces to physical devices such as RTUs and PLCs, these interfaces are typically simplistic and foster integration solutions which are closely tied to the physical hardware. To achieve true scalability for device connectivity, a software architecture that provides a level of abstraction from the specific devices is required. Wonderware has developed such an architecture to provide outstanding integration with a vast array of devices while providing true abstraction from the details. What does this mean in practice? Well, it means for example, that a device-independent application could be developed for a project using one specific family of PLCs, making use of all of the connectivity capabilities provided by that device. The challenge comes when it is necessary to automate a similar area at a facility — one that was built at a different time and uses a completely different family of PLCs and equipment. With Wonderware's DA Server (Data Access Server) and DI Object (Device Integration Object) capabilities, the software application can be easily re-purposed for a different family of hardware devices without changing the application. Multiply that efficiency over many pieces of equipment and many different hardware systems, and the result is a truly scalable software solution. Of course, implementing the application is just part of the effort. For effective scalability, it is necessary to be able to configure, monitor and run diagnostics on multiple I/O interfaces from a convenient central location. Wonderware's device connectivity architecture provides comprehensive remote management capabilities, built-in diagnostics and flexibility to deploy in a variety of architectural topologies to suit the needs of the business — the hallmarks of a truly scalable infrastructure.

Archestra technology provides a separation of application code from device communications management, so both can be easily managed and updated:

- a. Takes a flat communications model and adds structure and better manageability
- b. Makes individual communication paths available globally for any application to use
- c. Enables communications and device naming to be different for the same application, facilitating re-use on any machine

6. Horizontal Scalability

Supervisory systems do not stand in isolation. They need to integrate smoothly and reliably with a wide range of peer-level systems including MES, DCS, Historians, LIMS and Quality Management systems. Historically, the solution to these kinds of integration tasks has frequently consisted of crude interfacing attempts using proprietary interfaces,

middleware and limited data-level integration. These approaches, while barely satisfactory for standalone solutions, are the antithesis of scalability, requiring custom approaches and significant expenditure for system integration work. A truly scalable solution for horizontal integration of this kind requires a purpose-built integration architecture. Wonderware's System Platform and Supervisory Software Solutions were designed with scalability and integration capabilities built-in (see Figure 2, page 4). Embracing standards such as OPC, SQL, OLE DB/ADO and XML with a highly-scalable, object-oriented core has enabled Wonderware to deliver the most easily scalable solution set available.

7. "Baked-in" Scalability

Traditionally, scalability can not be added into operational systems after the fact. True scalability comes from purposeful design. Legacy systems can be integrated into a scalable infrastructure, but the real benefits come from starting with the right platform. The Wonderware System Platform was developed from the ground up to provide ease-of-use from day one, and scalability for the lifetime of the operation. This "baked-in" scalability comes from a powerful, pragmatic, component object-based engineering environment that encapsulates engineering efforts and intellectual property, enabling software solutions to be securely deployed and replicated across multiple areas as required — without physically visiting each system. This scalability also comes in the form of centralized management which permits oversight, reconfiguration, diagnostic analysis and security management of entire solutions on numerous computers that are geographically distributed across an organization. Training, skills and familiarity with systems in one area of operation are immediately transferable to different areas. This kind of scalability delivers tremendous economies of scale as solutions are rolled out to new areas of the operation. A unique, logical abstraction via a *model view* vs. a *deployment view* (Figure 3, next page) provides unsurpassed capabilities to retain engineering efforts put into a system over time, while increasing application functionality incrementally over time, one step at a time.

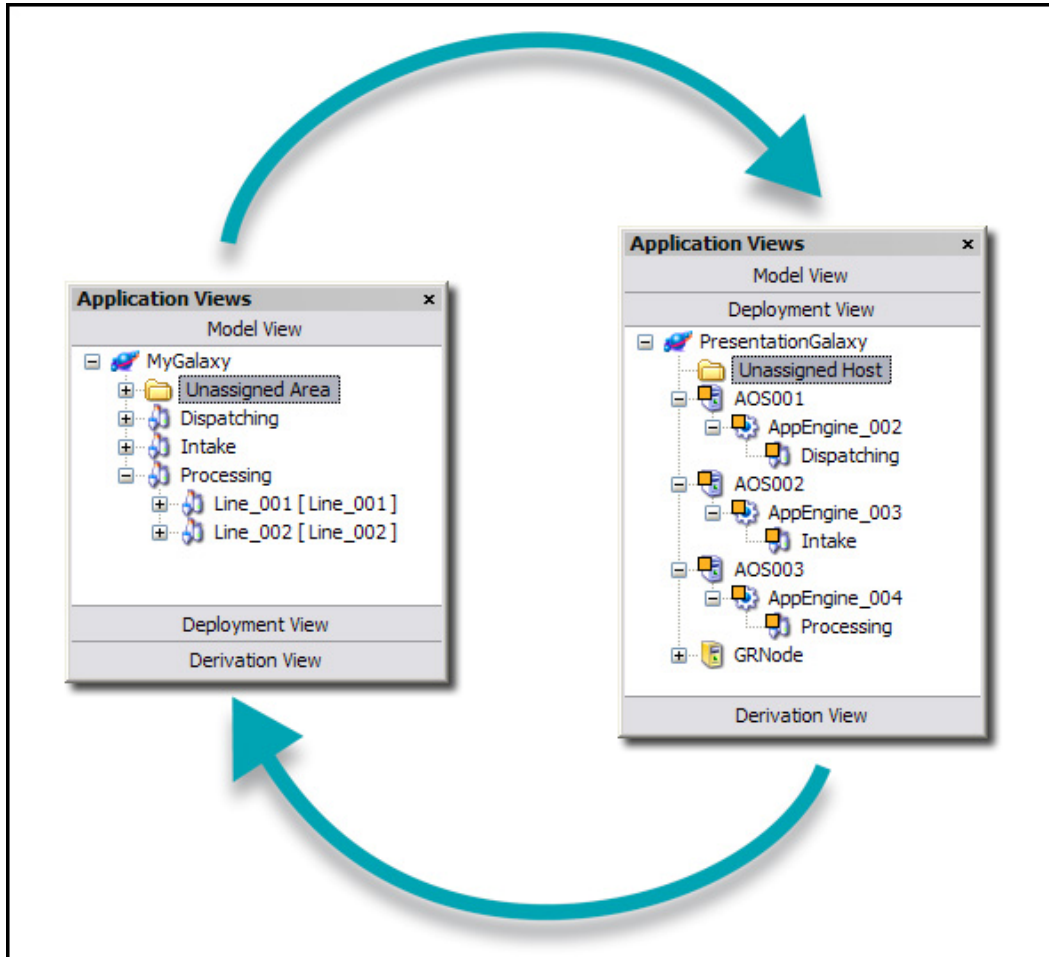


Figure 3 – Model View and Deployment View

8. Summary

Ease-of-use and scalability are two of the most important characteristics of a supervisory software solution. Combined with outstanding functionality, it is these characteristics which provide real investment protection for the future. Wonderware software’s scalable design and easy-to-use tools uniquely embody these characteristics — specifically, the powerful Wonderware System Platform and InTouch visualization tools. With an outstanding range of device integration options and powerful Production and Performance Management Software Solutions, Wonderware has set a new benchmark for combining ease-of-use with unparalleled scalability.

To learn more about Wonderware’s Supervisory HMI Software Solutions, visit www.wonderware.com/products/supervisoryhmi.



Contact Wonderware or your local Wonderware Distributor for more information on industrial automation and information software solutions. www.wonderware.com/contactsales

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