Foxboro Evo™ Process Automation System

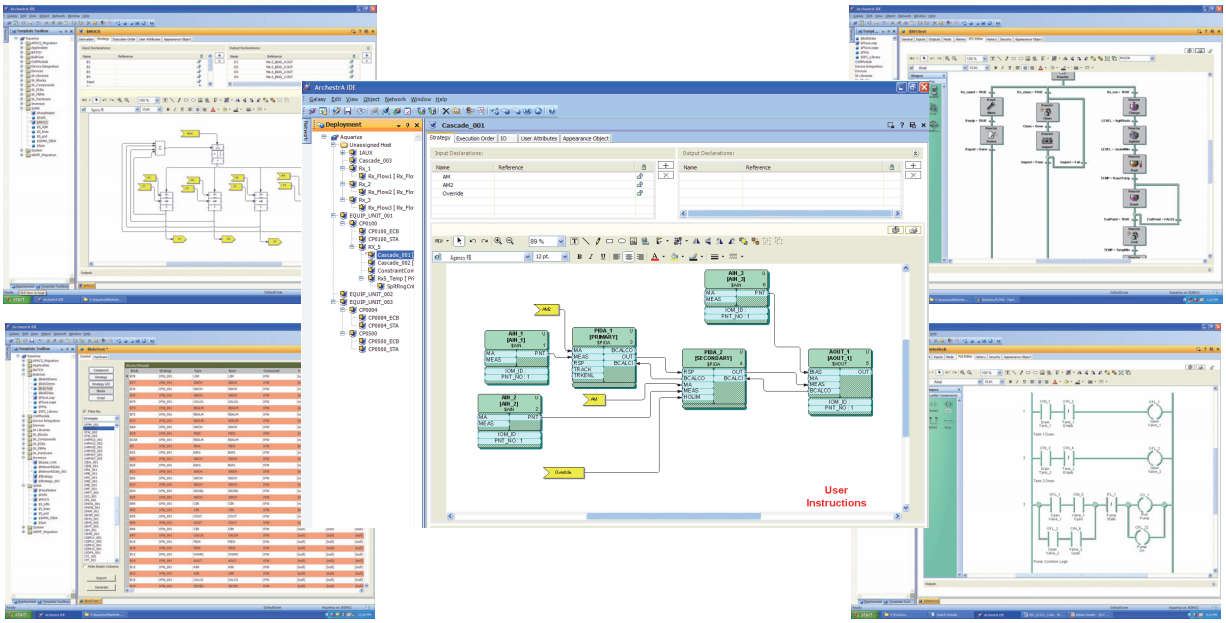
Product Specifications

Foxboro®

by Schneider Electric

PSS 31S-10EDITOR

Control Editors



The components of Foxboro Evo™ system are interconnected to support the system's mission within the plant. Control Editors can be used to configure the system to support the necessary communications and to develop control schemes needed to operate the plant correctly. When configured and downloaded into a controller, the control scheme is connected to live data and its operation can be observed graphically. This enables the engineers, operators, and maintainers to determine the status quickly and to clear interlocks and permissives during plant evolutions.

OVERVIEW

The Control Editors are constructed using the Microsoft® desktop metaphor and include several menus, tool bars and views, such as the Template Toolbox and Network View as shown in Figure 1. The Strategy Editor Area provides a drawing canvas and associated tables and Winforms used for the graphical construction of control strategies.

The Control Editors enable the user to design Foxboro Evo Control Strategies, System Configuration, and Application Objects.

Control strategies are assigned to compounds, which are in turn assigned to individual control stations.

- A control station is the hardware platform that executes the regulatory, sequential, logical and supervisory control strategies contained in a compound assigned to the station.

- A compound is the top level and is assigned to a physical control station. The compound contains a set of user-designed strategies.
- A strategy template is a configured object representing a functional control entity, engineered to be reusable. The Strategy is a collection of Blocks and inner Strategies that are typically linked together. A Strategy may be instantiated as a control entity such as a Loop.
- A Block is the fundamental control element and represents a specific type of control function. Foxboro Evo systems support over a hundred different Control Blocks.

FEATURES

The Control Editors enable:

- Graphical construction and deployment of Foxboro Evo control strategies
- Construction of re-usable control strategy component and composite designs
- User-defined renderings of re-usable control strategy components and composites
- Printed reports of control strategy drawings and supporting information
- Live updates/edits of real-time values superimposed on control strategy drawings
- Bulk generation of control strategies from stored templates and external project data
- Bulk migration of control strategies from installed I/A Series® and Foxboro Evo systems
- Ability to import and export control strategy designs
- Ability to create and deploy ArchestrA® IAS Platforms, Engines, Application Objects.
- Support for configuring FOUNDATION fieldbus and PROFIBUS-based intelligent devices and fieldbus networks
- Remote Desktop Services (for stations with Windows 10, Windows Server 2016. Windows 7, or Windows Server 2008 R2 Standard).

BENEFITS

The Control Editors offer substantial engineering productivity and quality gains to application designers and project engineers during:

- Initial project engineering through programmatic interfaces to third-party applications and external file systems supporting XML information exchange
- All project lifecycle stages, where the documentation is kept in synch with the configuration, as modifications are made
- Large scale expansions and modifications to the current designs
- Interoperability with other Foxboro® and third-party applications

They also offer enhanced value to those users who want to use the Foxboro Evo system in more than one project. They provide the ability to migrate intellectual property from one installation to another with extensive tools to edit that intellectual property to fit the circumstances of the new project.

The Control Editors are useful to current users of I/A Series and Foxboro Evo systems, who want to upgrade their existing system to the latest technology. This can be done by providing utilities to convert the intellectual property in their existing system to the paradigms of the new system. This can include graphical representations of control strategies.

This tool set is built upon and conforms to industry standards including Microsoft.NET Framework and ArchestrA Framework. Graphical editors within the configuration tool set utilize and take advantage of Microsoft Visio® application as the rendering engine.

The Control Editors provide graphical design, configuration, deployment and commissioning tools for systems using protocols such as PROBIFUS and FOUNDATION Fieldbus (FF).The graphical design tool for Strategy construction is shown in Figure 1.

The server for the Control Editors supports concurrent client access with record locking.

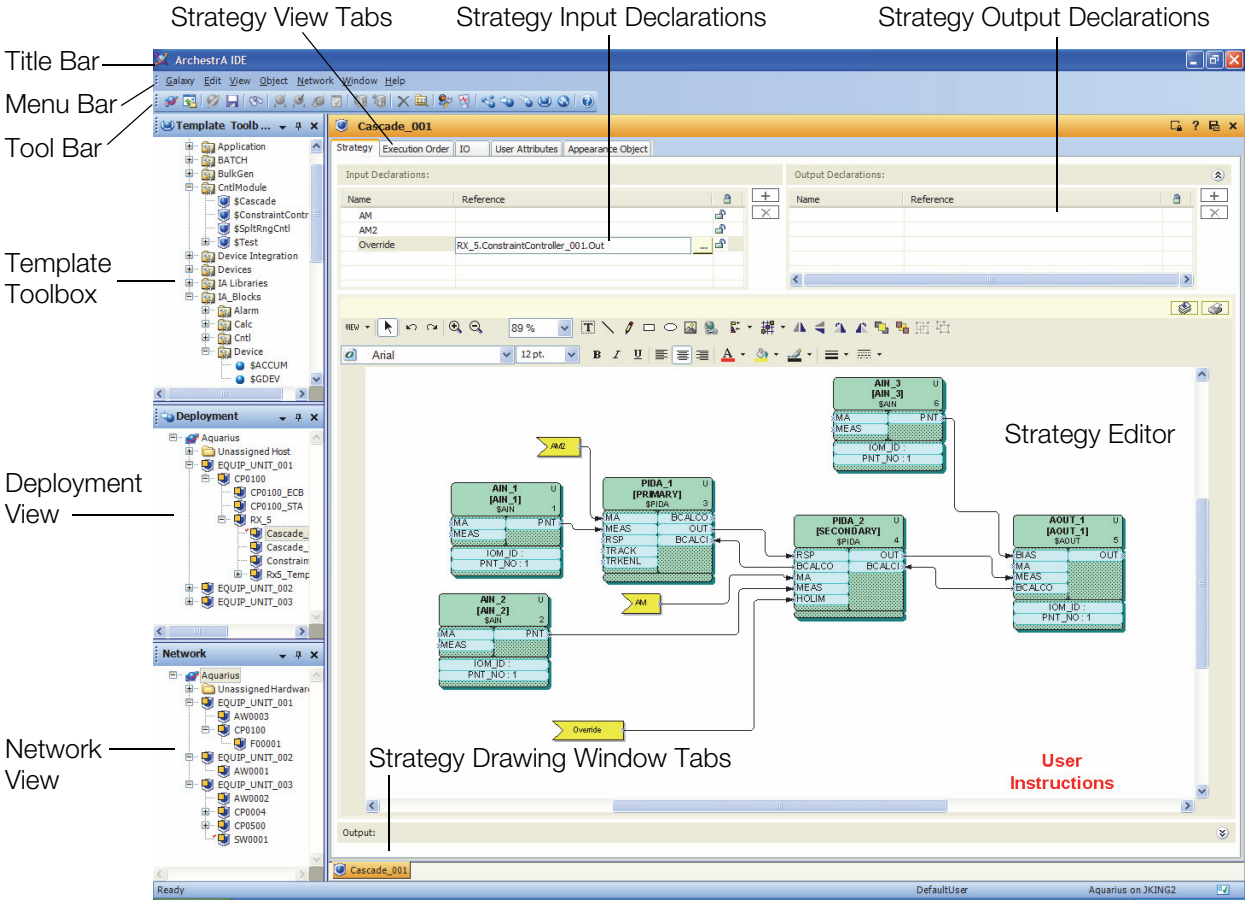


Figure 1. Control Editors Navigation

STRATEGY CONSTRUCTION

A new strategy is developed by deriving a new template or instance from the base or derived strategy, naming it and opening it. This creates a new drawing canvas for constructing the strategy. Base or user-derived Block templates are dropped onto the drawing canvas and linked together by connecting exposed parameters on the Blocks using a line drawing. Strategy connectors (inputs or outputs) are created and dropped onto the canvas and linked to block parameters. These connectors link Strategies together either from an inner to outer Strategy as discussed or from a peer-to-peer Strategy connection, as shown in Figure 2.

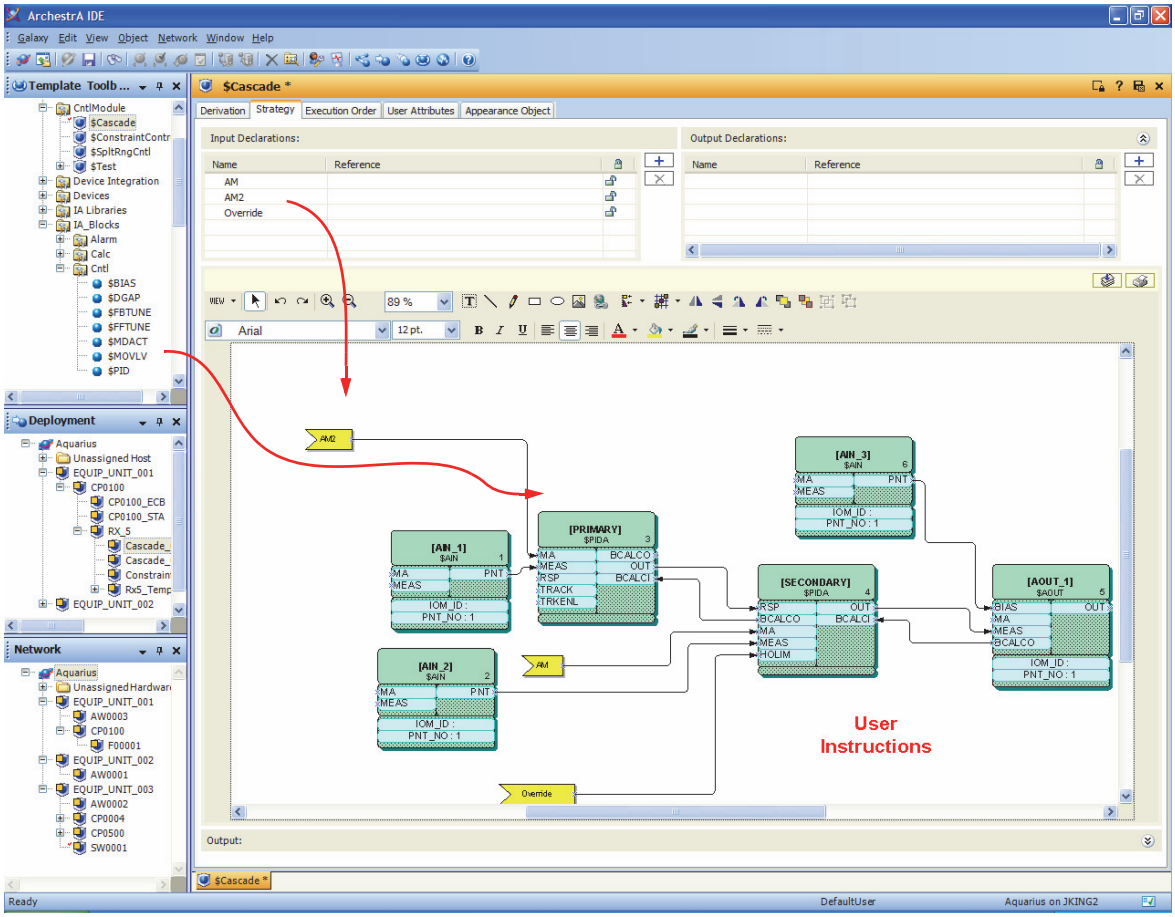


Figure 2. Constructing a Strategy

Execution Order of Strategy Components

The Control Editors enable the user to determine the order of execution automatically based upon the data flow through the strategy or manually by selecting the order of execution.

The order of execution of Blocks/Strategies within a containing Strategy is crucial to avoid introducing unwanted dead time into the strategy execution order.

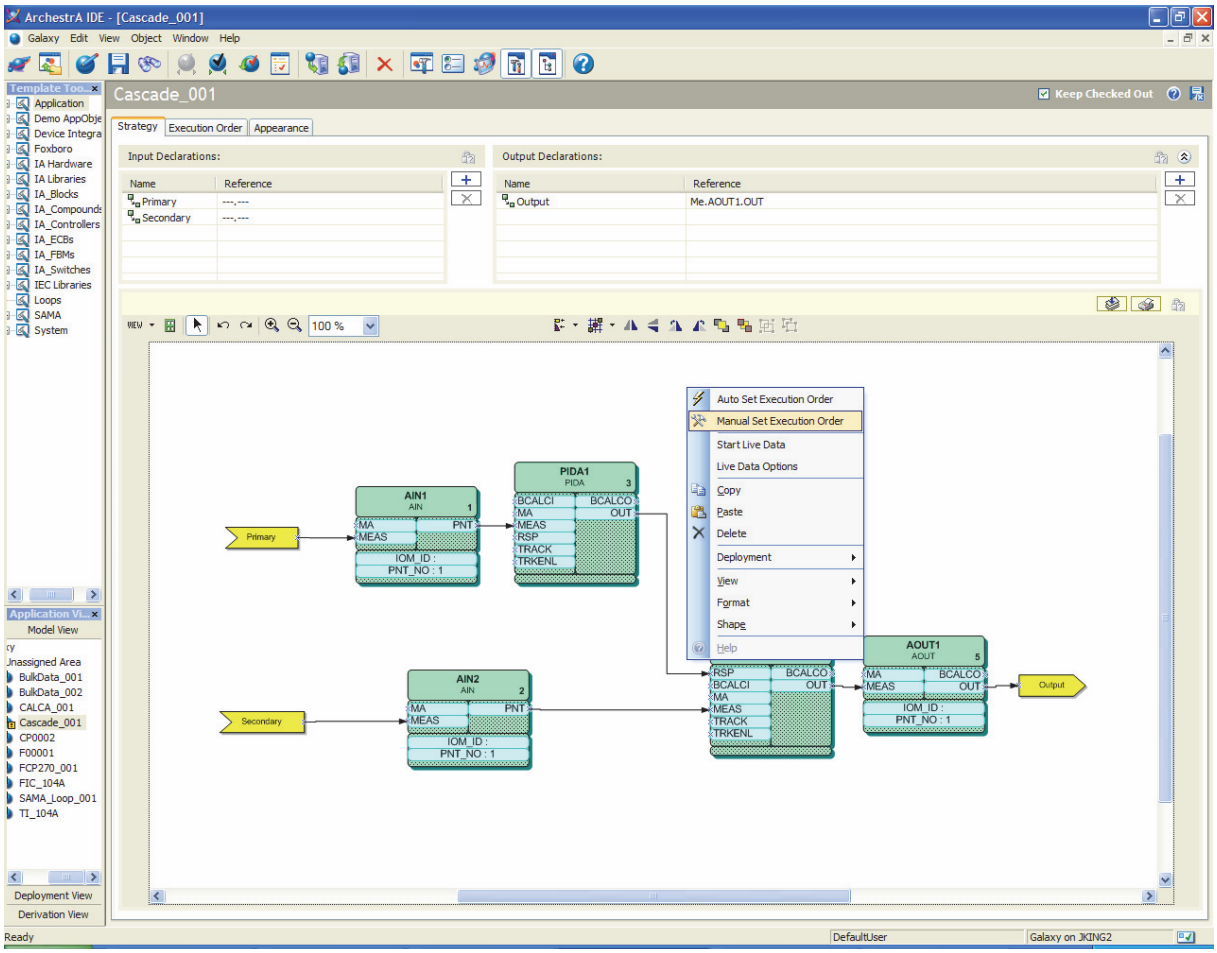


Figure 3. Setting the Execution Order

Live Data Updates on Strategy Diagrams

The Control Editors provide a graphical display that superimposes real time updated values at the connections between blocks in a deployed strategy. It also provides the capability to access deployed control strategies from the Strategy Editor.

Blocks/Strategies are selectable for editing purposes. The user can then upload values in the target controller to the database or download settable parameters in the database to the target controller without implementing a deploy procedure.

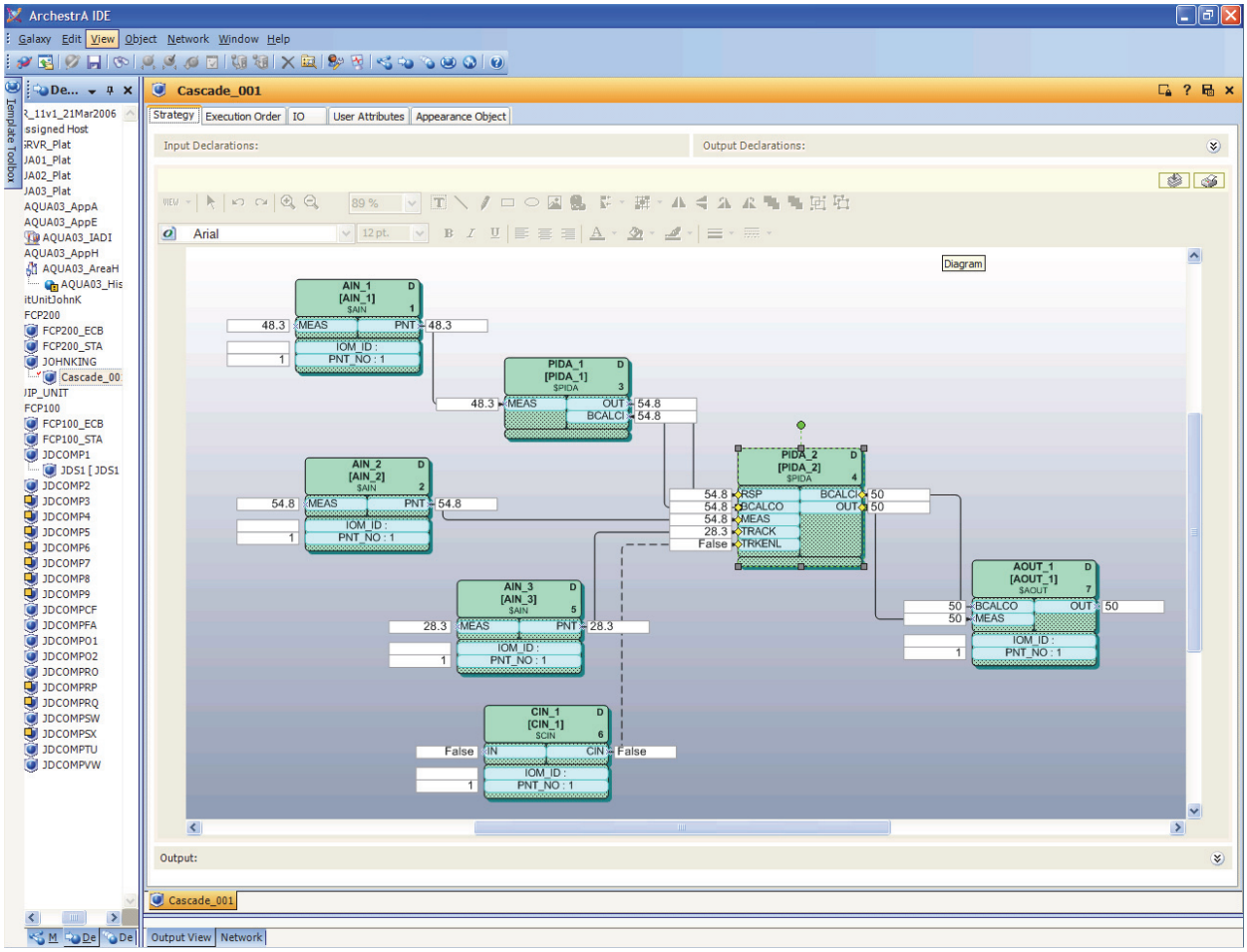


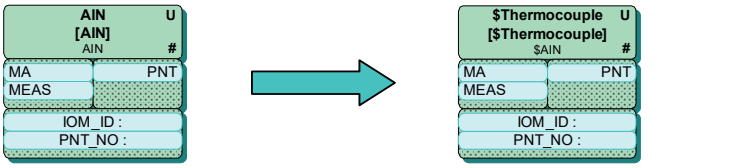
Figure 4. Live Data Updates on a Strategy

Block Properties and Behavior Specification

Once a control strategy has been designed, its behavior and properties have to be specified. This primarily consists of specifying its constituent parts, namely base and user-derived blocks.

Blocks are available as either base or user-derived templates which are available for reuse in Strategy templates or instances. In all cases specifying the properties and behavior of these blocks is the same.

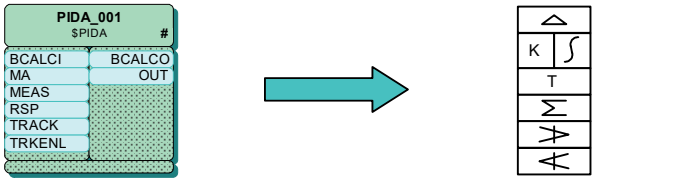
A new Derived Block Template represents a specialization of the original Block type. Typical examples include specializing a base Analog Input block template to represent an Iron-Constantan thermocouple input block type as shown in Figure 5.



Base Analog Input Block Type Derived Thermocouple Block Type

Figure 5. Derived Thermocouple

Other specializations include modifying the appearance or exposing certain features of various function blocks. One example would be to derive a base PIDA block into a specialized SAMA representation of a control entity as shown in Figure 6.



Base PIDA Control Derived SAMA Control

Figure 6. SAMA Representation

Strategies

The Strategy Editor enables users to nest Strategies. This specialization process enables the user to create libraries of Strategy Templates that are composed of sets of connected blocks.

To illustrate this capability, Figure 7 shows an example where a Reactor Temperature Control Strategy template has been constructed from inner Strategy templates called CasHOL and SplitRange. These inner Strategy templates are formed from Foxboro Evo block types.

NOTE

The yellow connectors in the two inner Strategies become connectable properties of the blocks in the outer Strategy.

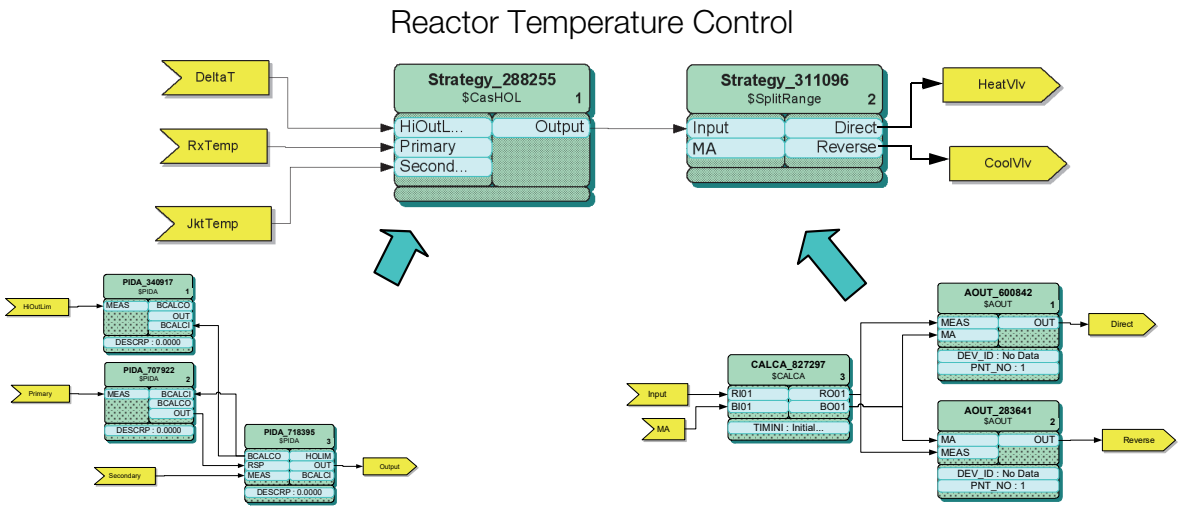


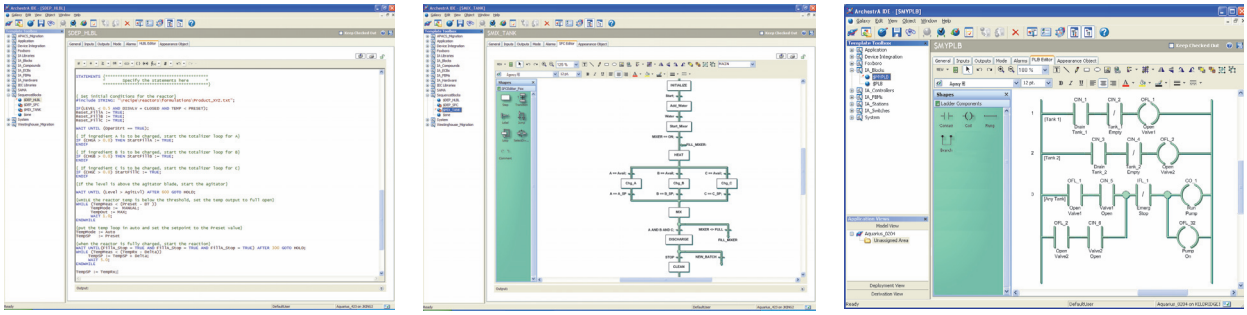
Figure 7. Construction Process

Programmable Block Editors

Foxboro Evo systems offer programmable block types including:

- General purpose calculator style block types [MATH, LOGIC, CALC, CALCA].
- A series of block types programmed in the High Level Batch Language [HLBL].
- Block types programmed in Sequential Function Charts [FoxSFC].
- A block type that is programmed in a Ladder Logic Diagram that executes in I/O Modules.

The Control Editors provide a text editor for programming the High Level Batch Language and a graphical editor for programming Sequential Function Charts and Ladder Logic Diagrams as shown in Figure 8.



High Level Batch Language Editor | Sequential Function Chart Editor | Ladder Logic Diagram Editor

Figure 8. Programmable Block Editors

SYSTEM CONFIGURATION

The Control Editors enable the user to construct a Foxboro Evo system configuration, including control stations and Fieldbus Modules by instantiating these base types and renaming them according to user preferences. Then an engineer uses the Network View to assign these stations and modules to their designated Unit Areas.

Figure 9 shows five user defined Unit Areas in addition to the Unassigned Hardware node. These are Centrifugation, Purification, Reaction, Solvent Recovery, and Tank Farm. It further shows two workstations and three Controllers assigned to the Reaction Area and two FBMs assigned to the RX0100 Controller.

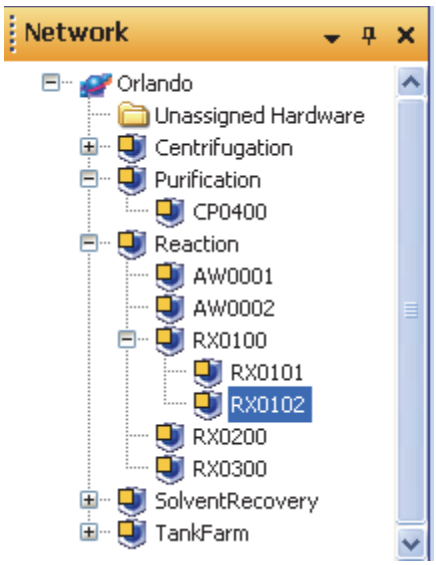


Figure 9. Network View of System Configuration

Intelligent Device Configuration

Control Editors support the access, configuration, monitoring, diagnostics, commissioning and troubleshooting of digitized field devices connected using FOUNDATION FIELDBUS, HART and PROFIBUS technologies. For more information refer to the following documents:

- *Field Device Manager for FOUNDATION fieldbus* (PSS 31S-10FDMFF)
- *Field Device Manager for HART Devices Control and I/O* (PSS 31S-10FDMHRT)
- *Field Device Manager for PROFIBUS-DP Devices* (PSS 31S-10FDMPB)

Bulk Generation of a Project

The Control Editors offer extensive engineering productivity tools such as the ability to bulk generate a project database from user defined templates combined with project specific information stored in formats like Microsoft Excel® or CSV, SaveAll, IACC Export, SysDef Export, or in a proprietary XML document.

The Control Editors can also migrate control strategies stored in the existing Foxboro Evo system installations from the data stored in existing control stations. The bulk data is first imported into a data grid allowing the user to inspect it and make any necessary additions or modifications.

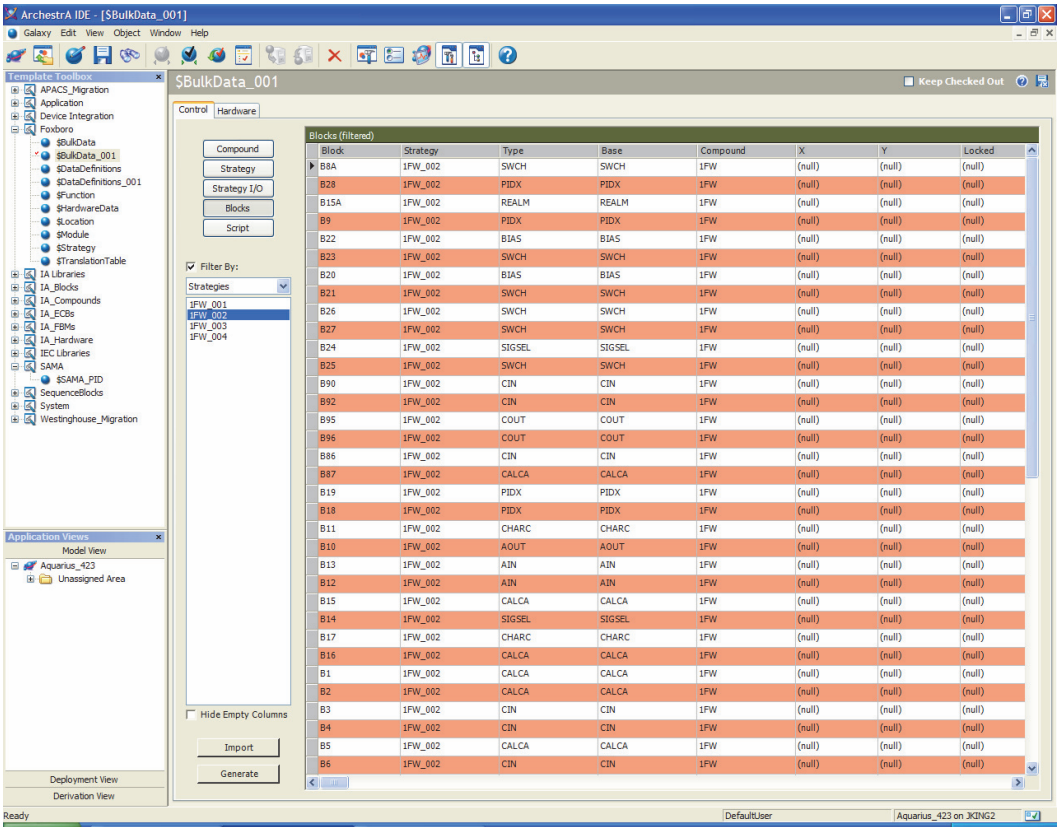


Figure 10. Bulk Generation of a Project

Bulk generation has the capability for applying Visual Basic® scripts to selected portions of the grid such as specific strategies or compounds to make bulk edits to the information. Once the user is satisfied with the structure and content, this grid is then used to generate the requisite control strategies and system configuration.

Once a Strategy is correctly assigned to a compound and the compound to a controller, it can be deployed using commands selected from the object in the Deployment View, or one of the other Control Editors' Application Views.

CONTROL STRATEGY DEPLOYMENT

The targets updated in the deployment include:

- Compounds and blocks are downloaded to the Foxboro Evo system including the assigned Controller and the Compound Summary Access (CSA).
- Security access settings for compound and block attributes are loaded into ArchestrA Security.
- ArchestrA History is updated with the collection points configured in the compounds and blocks.

When a strategy or compound is later modified using the Control Editors, it needs to be re-deployed to implement the changes in the runtime system. When a strategy or compound is re-deployed, only the affected targets are updated, and only the modified parameters are downloaded.

CONCURRENT ACCESS TO THE DATABASE

The Control Editors support multiple clients concurrently accessing the database via Remote Desktop Services (for stations with Windows 10, Windows Server 2016, Windows 7, or Windows Server 2008 R2). Networked clients execute their application independently from the server and only communicate when a client session is opened or closed. Remote Desktop Services use the resources of the server to perform their operations and remote clients to provide a user interface. These utilize different resources within the network architecture and can be used in combination to achieve optimal performance.

USER DEFINED APPLICATION OBJECTS

The Control Editors enable the user to construct Application Objects and deploy them to the Foxboro Evo Control Software Application Environments hosted by ArchestrA Industrial Application Servers. These are created by the Galaxy Repository. Figure 11 depicts an OLEDB database application created as an Application Object.

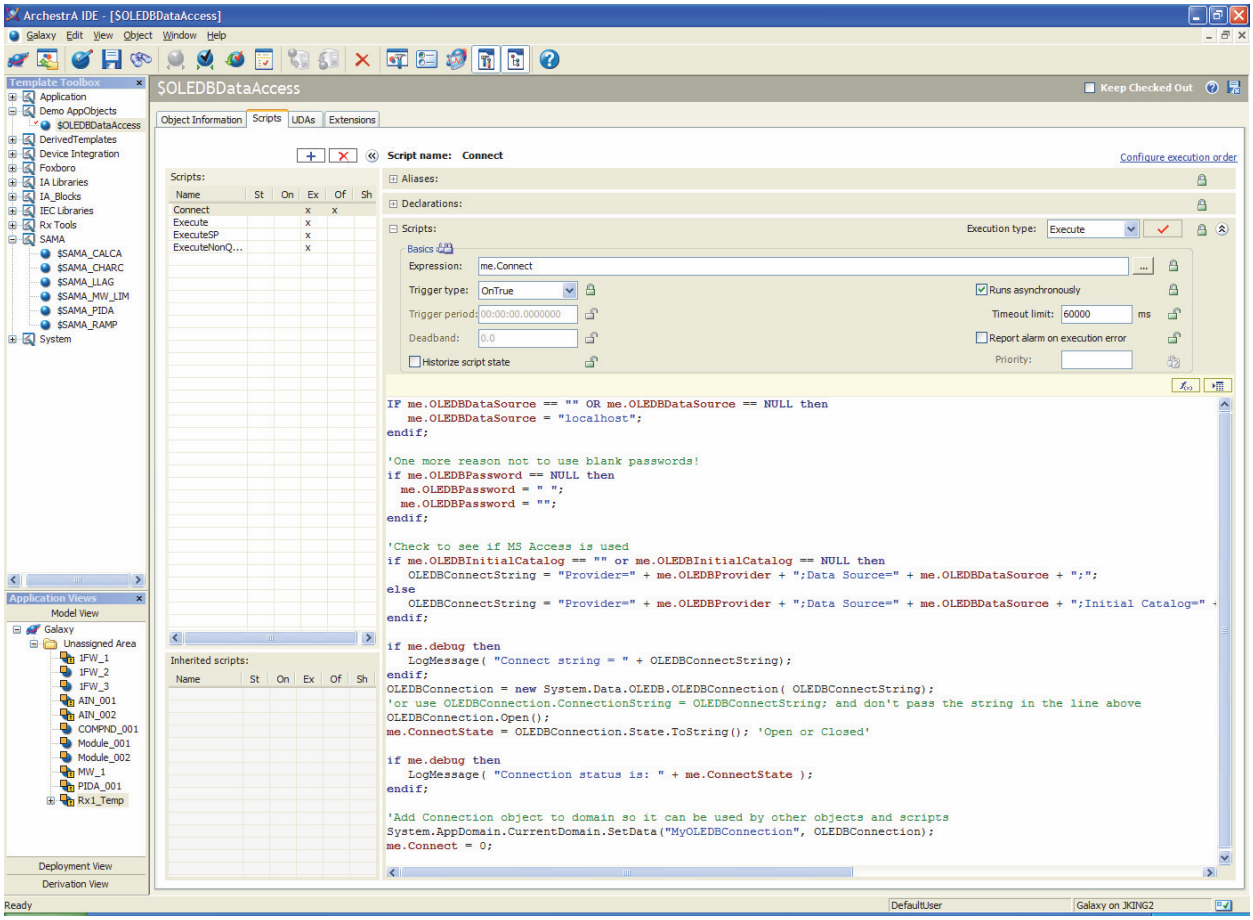


Figure 11. Application Object to Read/Write to a Database

ACCESS SECURITY

The Control Editors utilize an ArchestrA Role-based security model where users subscribe to different roles depending upon their job requirements. Roles have associated access permissions and security groups. Security groups have various plant areas assigned to them.

A user's subscription to a particular role provides access to specific security groups (plant areas) with specified access permissions (Operate, Secured Write, and so on) in those groups.

The authentication process is *user_name* and *password*.

The security model can be locally based or tied to the operating system of the hosting computer or to a Microsoft Active Directory (R) setup (recommended).

CHANGE TRACKING

The Control Editors provide an integration with the Change Tracking feature of System Advisor for Foxboro DCS as well as FoxCTS Change Tracking software. All control configuration and program changes deployed to control processors from the Control Editors are reported to connected software to provide tracking of control system changes to help meet regulatory body requirements. Examples of program changes are HLBL or FoxSFC program changes in Sequence Blocks or Ladder Logic Diagram (LLD) program changes in PLB Blocks.

RELATED PRODUCT SPECIFICATIONS

More details regarding the functionality provided within the Control Editors can be found in:

- *Logic Block Editor and Live Data Display* (PSS 31S-10LBEDIT)
- Scripting with Direct Access (PSS 31S-10SCRIPT)

HARDWARE AND SOFTWARE REQUIREMENTS

Control Editors Server

- Software Version: Supports Control Core Services software v9.0 or later
- Workstation/server type: H91, P91, H90, or P90 (with Intel Pentium® 4, 1.8 GHz, or higher, processor)
- Operating System: Microsoft Windows® Server 2016 or Microsoft Windows® Server 2008 R2 Standard
- Database Software: Microsoft SQL Server® 2016, Microsoft SQL Server® 2008(1)
- Memory: 4 GB of main memory minimum. We recommend 16 GB for optimal performance.
- Hard Disk (We recommend): 16 GB free disk space
- Video Graphic Accelerator Card: 32 MB of memory
- Communications Network: 100 Mbps TCP/IP Switched Ethernet

Control Editors Client

- Software Version: Supports Control Core Services software v9.0 or later
- Workstation/server type: H92, or P92
- Operating System: Microsoft Windows® 10, Microsoft Windows® 7, Microsoft Windows Server 2016, or Microsoft Windows Server 2008 R2 Standard
- Computer: Intel Pentium 4, 1.8 GHz (or higher) processor
- Memory: 2 GB of main memory
- Hard Disk (We recommend): 16 GB free disk space
- Video Graphic Accelerator Card: 32 MB of memory
- Communications Network: 100 Mbps TCP/IP Switched Ethernet

Terminal Services or Remote Desktop Services Client

- On-Platform Station Type: H91, P91, H90, or P90
- Off-Platform Station Type: For Remote Desktop Services, Microsoft Windows Server 2016 or Microsoft Windows Server 2008 R2 Standard.
- Memory: 4 GB of main memory
- Hard Disk (We recommend): 32 GB free disk space

(1) Requires Microsoft.NET 2.0 to be installed. Microsoft .NET 1.1 is included as part of the Control Editors installation.

Foxboro®

by Schneider Electric

Schneider Electric Systems USA, Inc.
38 Neponset Avenue
Foxborough, MA 02035-2037
United States of America
www.schneider-electric.com

Global Customer Support
https://pasupport.schneider-electric.com

MB 031 0318