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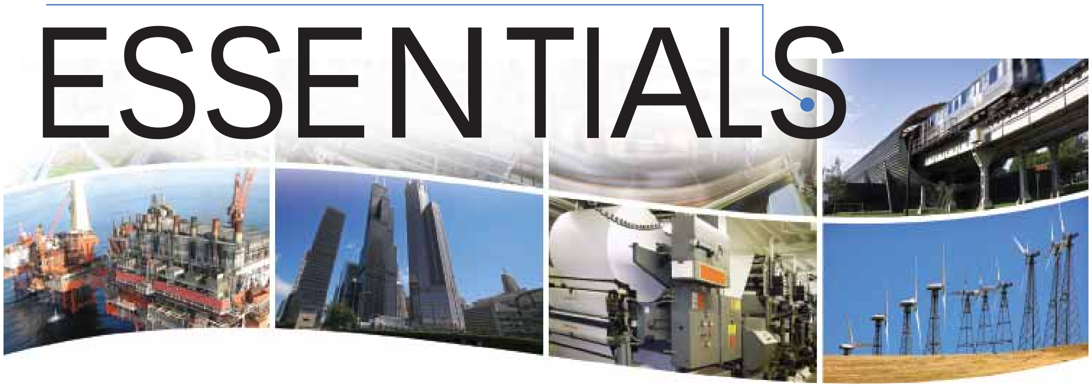
A TECHNICAL SUPPLEMENT TO CONTROL NETWORK

ESSENTIALS

® Contemporary Control Systems, Inc.



Brief Introduction to Sedona Framework

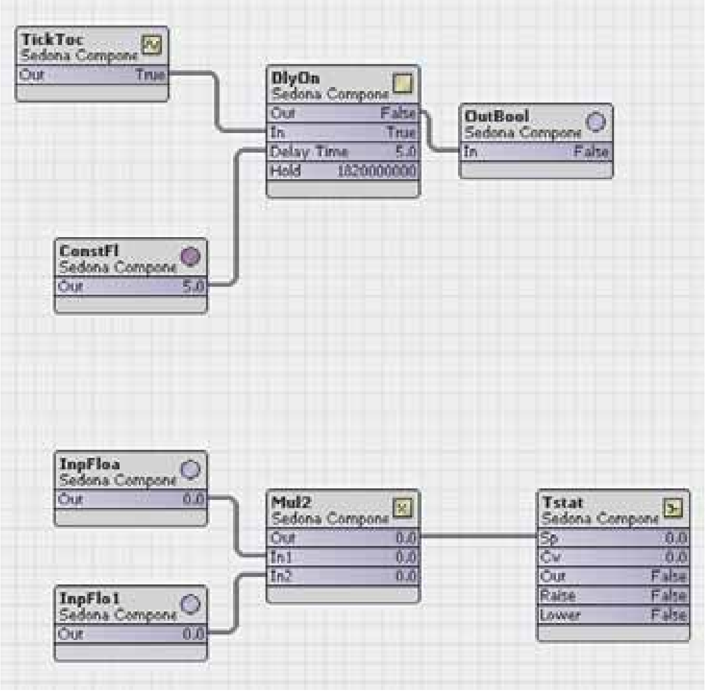
For those who understand Tridium's *Niagara Framework*, understanding *Sedona Framework* would be trivial. However, the market for Sedona Framework goes beyond the traditional HVAC market that Niagara Framework serves. Sedona Framework is intended to provide a complete development environment for devices with limited resources. The *Java* environment of Niagara Framework requires resources well beyond the capability of small devices but much of the Niagara concepts have been transferred down to Sedona Framework thereby allowing small devices to execute sophisticated control. While the BAS Remote is not a limited resource device, Sedona Framework executes nicely on this platform.

Sedona Workbench

In order to understand how Sedona is being used in the BAS Remote, we need to define some terms commonly used with either of the two Tridium Framework products. *Sedona Workbench* is PC-based *graphical user interface (GUI)* development tool that is used to develop Sedona applications. In Contemporary Controls' implementation it connects to the BAS Remote (the target platform) over IP/Ethernet. The Sedona Framework is comprised of *kits* that contain *components*; whereas components are used to implement Sedona applications on the BAS Remote. Components have properties that can be shown on *Property Sheets* and can be interconnected as shown on *Wire Sheets* using virtual *wires*. The user opens up a *SOX (Sedona protocol)* session on Workbench to the BAS Remote. Using *drag-and-drop* methodology, the user develops a control scheme by interconnecting components and by assigning properties to components. The final application is stored on the BAS Remote and saved on Workbench. A *Sedona Virtual Machine (SVM)*, which permanently resides in the BAS Remote, executes the Sedona code sent over by Workbench. However, as the application executes on the BAS Remote, the user can observe the execution on Workbench. With Workbench disconnected, the application continues to run since the application is stored in flash memory on the BAS Remote.

Palette, Kits, and Components

Sedona Framework provides a *Palette* of kits which total nine. One of the more interesting kits is called *Control* which includes a group of components similar to the components found in Niagara Framework. Although not as numerous, the Sedona control components are still very powerful. There are three types of variables that can be operated upon – floating point (float), binary (Boolean), and Integer (Int). For better understanding, the components in the control kit are shown sub-divided into functional groups.



TickToc
Sedona Compone
Out True

DlyOn
Sedona Compone
Out False
In True
Delay Time 5.0
Hold 1820000000

OutBool
Sedona Compone
In False

ConstFl
Sedona Compone
Out 5.0

InpFloa
Sedona Compone
Out 0.0

Mul2
Sedona Compone
Out 0.0
In1 0.0
In2 0.0

Tstat
Sedona Compone
Sp 0.0
Cv 0.0
Out False
Raise False
Lower False

InpFlo1
Sedona Compone
Out 0.0

A control strategy can be implemented by interconnecting components on a wire sheet.

The Logic Group — logical operations using Boolean variables

And2 Two-input Boolean product — two-input AND gate
And4 Four-input Boolean product — four-input AND gate
B2P Binary to pulse — simple mono-stable oscillator (single-shot)
BSW Boolean switch — selection between two Boolean variables
ConstBool Boolean constant — a predefined Boolean value
OneShot Retriggerable single shot — adjustable mono-stable oscillator
Or2 Two-input Boolean sum — two-input OR gate
Or4 Four-input Boolean sum — four-input OR gate
Not Boolean complement — inverter
SRLatch Set-reset latch — SR bi-stable oscillator (flip-flop)
Xor Exclusive OR — two-input exclusive OR gate

The Counter/Timer Group — extended Boolean logic

DlyOff Off delay timer — time delay from an "on" to "off" transition
DlyOn On delay timer — time delay from an "off" to "on" transition
TickTock Ticking clock — an astable oscillator used as a time base (multi-vibrator)
UpDn up-down counter — bi-directional, resettable counter

The Math Group — operations on Float, Integer and Boolean variables

Add2 Two-input addition — results in the addition of two float variables
Add4 Four-input addition — results in the addition of four float variables
Avg10 Average of 10 — sums the last ten float variables while dividing by ten
B2F Binary to float encoder — 16-bit binary to float conversion
Cmpr Comparison math — comparison (<=>) of two float variables
ConstFloat Float constant — a predefined float variable
ConstInt Integer constant — a predefined integer variable
Div2 Divide two — results in the division of two float variables
F2B Float to binary decoder — float to 16-bit binary conversion
F2I Float to integer — float to integer conversion
I2F Integer to float — integer to float conversion
LSeq Linear sequence — stepped binary response to an increasing float input
Mul2 Multiple two — results in the multiplication of two float variables
Mul4 Multiple four — results in the multiplication of four float variables
Neg Negate variable — reverses the sign of a float variable
Sub2 Two-input subtraction — results in the subtraction of two float variables
Sub4 Four-input subtraction — results in the subtraction of four float variables

The Control Group — operations that facilitate control

ASW Analog switch — selection between two float variables
Freq Pulse frequency — calculates the input pulse frequency
LP PID loop — proportional, integral, and derivative controller
Ramp Ramping function — controlled ramping of a float variable
Reset Rescale variable range — rescales output range of a float variable
Tstat Thermostat — on/off temperature controller

The Sedona control kit does not address physical I/O points since these will differ with each vendor. Contemporary Controls has provided a BAS Remote kit with the necessary components that will link Sedona components to physical I/O points. Since the BAS Remote utilizes universal I/O, these points must first be configured through the BAS Remote web page. BACnet instances are automatically assigned during configuration. These instances must then be assigned to the appropriate component from the list below.

InpBool — Binary input (BI)
OutBool — Binary output (BO)
InpFloat — Analog input (AI)
OutFloat — Analog output (AO)

Summary
As you can see from the list of components, both analog and digital control schemes can be developed and executed on a compact platform like the BAS Remote. In future articles, we will look into more of the kits to learn more about their associated benefits.