



Energy AnalytiX Integration with Historian Servers



APPLICATION NOTE

September 2013

Description: Guide to Energy AnalytiX integration to Historical data.

OS Requirement: Windows 8 x64 (Professional or Enterprise Edition), Windows 7 x64 (Professional or Enterprise Edition), Windows Server 2012 x64, Windows Server 2008 R2 x64, Windows Vista x64 SP2 (Business, Ultimate, or Enterprise Edition), Windows Server 2008 x64

General Requirement: ICONICS AnalytiX 10.70+, MS SQL Server 2008 R2 or later, understanding of OPC UA data access.

Introduction

One of the many new features of Energy AnalytiX for the 10.70 release is the support to retrieve and integrate historical data from ICONICS Hyper Historian as well as 3rd party historians supporting the OPC UA historical data access interface.

Energy AnalytiX utilizes meter data as well as asset bindings to perform its energy related calculations. The meter data, as shown in Figure 1, are utilized in standard consumption calculations, such as consumption, input, output and loss on a per meter type basis.

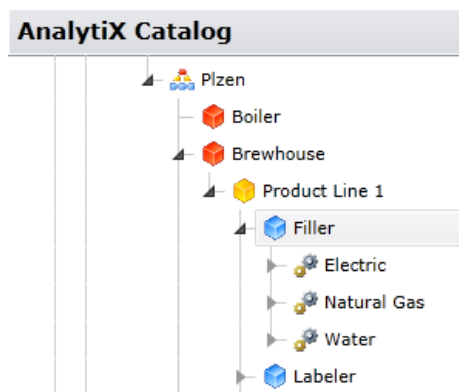


Figure 1 - Energy AnalytiX meters

In addition, energy asset bindings are utilized in derived calculations, which are based on the standard calculations and asset bindings. For example, an asset binding can be a production count variable, used in a derived calculation to normalize consumption by production counts, as shown in Figure 2.

Enabled	Metadata	Source tag	Scan
☒	Occupancy	150	60
☒	Floor space	200	60
☒	Gross Area	2655	60
☒	Glass Area	70	60
☒	Renovated	2010/01/01	60
☒	Location	Filler Location	60
☒	Oil	@sim64:Double.Random (360,0,60,0).Value	300

Figure 2 - Energy asset bindings

Preparing to Configure Energy AnalytiX for Historical Data

Historical data are external data to Energy AnalytiX data and typically their sequence in time can be different than the automatically collected data. As such, Energy AnalytiX utilizes a trigger mechanism to control the historical data requests and integration with the data flow of Energy AnalytiX, as shown in Figure 3.

A new tab has been added to the Energy AnalytiX provider, to configure triggers utilized in historical data retrieval.

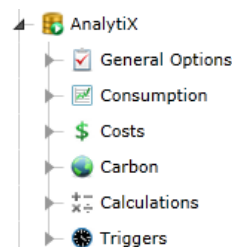


Figure 3 - Historical data triggers

The user can define trigger folders and within each trigger folder, new triggers, as shown Figure 4.



Energy AnalytiX Integration with Historian Servers



APPLICATION NOTE

September 2013

Figure 4 - Historical data trigger configuration

The Advanced tab of the trigger configuration contains advanced parameters, such as the trigger delay. Key elements of the trigger configuration are:

- **Trigger Start Date:**
The date from which the periodic trigger will start creating events so that historical requests will be posted
- **Trigger Recurrence:**
The interval for which to post historical requests, for example hourly, daily etc. Typically this should be a multiple of the Energy AnalytiX base summary period and it is the related trigger's period.
- **Trigger Delay:**
An offset to accommodate for possible delays within the Historian in calculating the requested aggregates. If utilized, the trigger will create a periodic event at times equal its trigger period plus the offset
- **Synchronization Time:**
The (optional) time at which to synchronize data requests (typically 12:00 AM)

Here are some sample scenarios to understand the related configuration parameter significance

User Scenario 1:

Trigger Start Date: 2012/03/06 12:00:00 AM
Trigger Period: 1 hour
Trigger Delay: 5 minutes
Synchronization Time: 12:00 AM

Expected behavior:

Energy AnalytiX will post the following historical data retrieval requests:

Trigger Time	Data Request
00:05 AM	23:00 PM ->24:00 AM
1:05 AM	24:00 AM ->1:00 AM
2:05 AM	1:00 AM ->2:00 AM

User Scenario 2:

Trigger Start Date: 2012/03/06 12:00:00 AM
Trigger Period: 1 day
Trigger Delay: 6 hours
Synchronization Time: 5:00 AM

Expected behavior:

Energy AnalytiX will post the following historical data retrieval requests:

Trigger Time	Data Request
6:00 AM (day2)	5:00 AM (day1)->5:00 AM (day 2)
6:00 AM (day3)	5:00 AM (day2)->5:00 AM (day 3)
6:00 AM (day4)	5:00 AM (day3)->5:00 AM (day 4)

Configuring triggers is the very first step for enabling historical data access for Energy AnalytiX. Typically the trigger periods should be reasonably large as to not overload the system. In addition, a trigger delay should be utilized to make sure that the desired data are available within the Historian server. A typical example would be a 15 minute or 30 minute trigger period with say a 5 minute delay. The exact timing of when the trigger will create periodic events depends highly on the trigger start date, trigger period and trigger delay.



Energy AnalytiX Integration with Historian Servers



APPLICATION NOTE

September 2013

Configuring Meters to Utilize Historical Data

The energy meter configuration forms have been enhanced to allow for a new data source type, called Historian as seen in Figure 5.

Data Source Type: **Tag**
Value Type: **Tag**
Rollover Value: **Historian**

Figure 5 - Historian data source

Once the user has selected the Historian data source, several options are enabled on the Meter Configuration form, as shown in Figure 6.

Historical Aggregate: **Total**
Trigger: **Trigger30Minutes**
Processing Interval (Min): **5**

Figure 6 - Historical data options

The user can select a historical data aggregate to access historical data from the built-in list of supported aggregates, as shown in Figure 7.

Historical Aggregate: **Average**
Trigger: **Interpolative**
Serial Number: **MinimumActualTime**
Location: **MaximumActualTime**
Range

Figure 7 - Historian data aggregates

In addition, the user will need to select a trigger, to trigger the historical data requests as well as a processing interval. The processing interval, in minutes, determines how the historical data will be processed and aggregated. If set to a zero value, the entire aggregate value for the trigger period will be retrieved. If set to any non-zero value, an aggregate value will be retrieved for every processing interval (for example 5 minutes averages).

Configuring Asset Bindings to Utilize Historical Data

The user can also enable asset bindings to utilize historical data. Historical data support is reserved only for the asset bindings that have been configured to have a Historian data source, as shown in Figure 8.

Name	Description	Source Type	Data Type
Click here to add new item			
Construction Year	Construction Year	Static Value	Date
Contact	Contact Information	Static Value	String
Gross Area	Square footage	Static Value	Integer
PowerFactor	Power factor	Tag	Float
Serial Number	Serial number	Static Value	String

Figure 8 - Historian data source for bindings

Once a binding is enabled for historical data access, the user can select related historical data aggregate; trigger and processing interval within the asset bindings property page, as shown in Figure 9.

Enabled	Metadata	Source tag	Scan	Aggregate	Aggregate Period	Trigger
Click here to add new item						
		@Bm64.Double.Random	300			
		(360,0,60,0).Value				
		Scrap weight	HyperHistorian/Configuration	60	Total	5
		LogGp/OPCUA/Ramp				Trigger30Minutes

Figure 9 - Historian data configuration for bindings

Overall Application Configuration Parameters

Several new application configuration parameters have been added to the Energy AnalytiX service configuration file in:

C:\Program Files\ICONICS\GENESIS64\Components\
IcoBizVizEAService.exe.config

The above file can be edited using notepad and the settings take effect when the Energy AnalytiX service restarts. Typically the default values should be sufficient for most applications.

```
<add key="maxTriggerQueuedEvents" value="1000"/>  
<add key="waitPeriodSecsForHistUpdates" value="30"/>  
<add key="percentDataBad" value="100"/>  
<add key="percentDataGood" value="100"/>
```

maxTriggerQueuedEvents



Energy AnalytiX

Integration with Historian Servers



APPLICATION NOTE

September 2013

Controls the maximum number of queued trigger events, to avoid overloading the system

waitPeriodSecsForHistUpdates

This specifies how long Energy AnalytiX will wait to process retrieved data from the Historian Server. Data updates from the Historian server are asynchronous and the above setting controls how long to wait between data callbacks until the supplied data are inserted into the Energy AnalytiX staging tables.

percentDataBad , percentDataGood

The above parameters control the quality of data returned by the Historian Server. The PercentDataBad Variable indicates the minimum percentage of bad data in a given interval required for the StatusCode for the given interval for processed data request to be set to Bad. (Uncertain is treated as defined above). The default value is 100.

The PercentDataGood Variable indicates the minimum percentage of Good data in a given interval required for the StatusCode for the given interval for the processed data requests to be set to Good. The default value is 100.

The PercentDataGood and PercentDataBad must follow the following relationship $\text{PercentDataGood} \geq (100 - \text{PercentDataBad})$. If they are equal the result of the PercentDataGood calculation is used.

Another useful IcoBizVizEAService.exe.config setting is the

```
<add key="totalSecondsSinceLastUpdateToWaitForExternalData" value="60"/>
```

The above setting controls how long Energy AnalytiX will wait to process, summarize and move the Historian server imported data (as external data) from its staging tables to the meter summary tables, so that they will be made available to calculations within Energy AnalytiX. Typically this should be set smaller than the fastest trigger period

Monitoring Historical Data Access

Energy AnalytiX has full TraceWorX support for historical data requests and data processing which can be utilized to troubleshoot Energy AnalytiX applications which utilize historical data.

In addition, inside the Energy AnalytiX MS SQL Server database there is a dedicated table, called EA_Trigger_Info, to monitor trigger related historical data requests, which includes the time

that the trigger was activated and the start and end times for historical data requests, as shown in Figure 10.

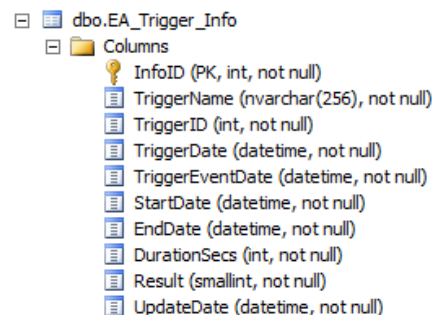


Figure 10 - Monitoring triggers for historical data

Native Hyper Historian Support

In addition to utilizing historical data, Energy AnalytiX version 10.70 will also support configuring meter and asset bindings historical tags within ICONICS Hyper Historian.

To enable the dedicated support for Hyper Historian, the user will have to edit the settings in the Energy AnalytiX provider General Options, Hyper Historian tab, as shown in Figure 11.

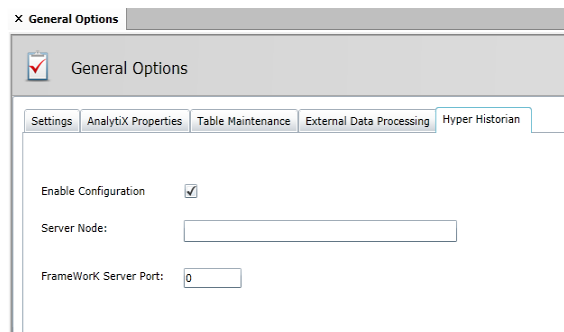


Figure 11 - Enabling Hyper Historian integration

The user will have to check the Enable Configuration button and optionally specify a server node, where Hyper Historian server resides, as well as a port number to access the Hyper Historian configuration. If the default values are left Energy AnalytiX will assume local installation of Hyper Historian and default port access, which is port 8778.

In addition, the user will have to setup logging groups and loggers, as well as aggregate groups, within the Hyper Historian configuration, so that Energy AnalytiX will be able to utilize them.



Energy AnalytiX

Integration with Historian Servers



APPLICATION NOTE

September 2013

Once the above settings have been saved to the database, a new option will be available to the meter and asset binding configuration forms, as shown in Figure 12.

Figure 12 - Hyper Historian tag configuration

The Configure Tag button allows the user to configure directly a historical tag inside ICONICS Hyper Historian.

The key option fields of the Hyper Historian tag configuration dialog are as shown in Figure 13.

Figure 13 - Hyper Historian tag configuration options

Name:

User defined to be the name for the Hyper Historian Tag to add.

Display name:

User defined, can be empty.

Description:

User defined, can be empty.

Signal name:

The source meter OPC tag address.

Is Collected:

User controlled, default value checked. If unchecked, it means that the specific data will be imported into Hyper Historian rather than been automatically collected.

In Group:

Gets populated from the Hyper Historian defined groups, which can be just logging groups or \Collector\Logging group based on the IsCollected option.

Folder Group:

Gets populated from the Hyper Historian defined data collection groups.

Data Type:

The available data types to select.

Support Operator Annotations:

User defined option to enable operator comments on the tag.

Stepped Interpretation:

User defined option utilized in historical data interpolation.

Engineering Units:

User defined option for engineering units.

High and Low Range:

User defined options for high and low ranges of the historical tag.

Add Tag Aggregate:

If checked, Energy AnalytiX will also add a tag specific aggregate, and the resulting Hyper Historian tag point name will be based on the selected aggregate.

Aggregate Group:

Gets populated from existing Hyper Historian aggregate groups.

Aggregate Type:

Gets populated from the Hyper Historian aggregate type enumeration. Based on data type, some aggregates may not be available.

Aggregate Name:

User specified name for the aggregate.

Aggregate Display name:

User specified, can be empty



Energy AnalytiX Integration with Historian Servers



APPLICATION NOTE

September 2013

When all the required parameters have been specified by the user, the user can click on the Add Tag button, to add the tag to Hyper Historian.

If the Add Tag Aggregate button is checked, the specified tag aggregate will be added to the Hyper Historian address space.

Upon successful addition of the specified tag into Hyper Historian, the Hyper Historian Tag configuration dialog will close and the corresponding Hyper Historian Tag point name, utilized to access the tag data via a Historian interface will replace the original meter tag. The formulated Hyper Historian tag point name represents the most common scenarios.

If the user desires, he can modify the returned tag point name to suit specific communication channels or other options.

Typically the returned Tag point name will be in the form:

`\\Node\HyperHistorian\\Configuration\folder\subfolder>tag name>tag aggregate name`

where folder and subfolder are the names of the parent and related children folders containing the newly added Hyper Historian tag under Data Collections.

For asset bindings, once the user adds an asset binding that is of Historian type, when the user selects the grid row that contains the specific metadata item, in a single selection type, and then the Configure Tag button will be made visible, as shown in Figure 14.

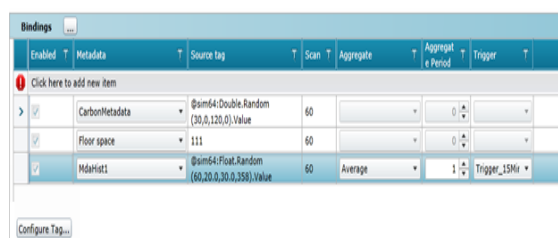


Figure 14 - Hyper Historian tag configuration for bindings

Hyper Historian Integration Scenarios and Considerations

In this last section, we would like to review some Energy AnalytiX application scenarios to identify when Hyper Historian integration support should be utilized.

If energy data are available both as real time OPC data as well as historical data, the user will have to decide on a best case deployment scenario to yield best possible system performance

and load balancing. Energy AnalytiX exhibits best performance when it collects automatically all the data at reasonable data collection rates. The key factor will be the data collection rate of the required Energy AnalytiX data.

If energy meter data or asset bindings data are collected at reasonably slow rates, that is 1 minute or slower, Energy AnalytiX is capable of handling the data volume.

In the case that energy meter data are collected every few seconds or certain asset bindings are collected at extremely fast data collection rate, then the utilization of a Historian, such as Hyper Historian, to collect the fast changing data and create required aggregates is a necessity.