

 CANARY VIEWS

VIRTUALIZE YOUR WORLD

Industry 4.0 and the Industrial Internet of Things (IIOT) are transforming the way physical assets are designed, managed, and maintained. Data is the lifeblood of the digital asset world. The Canary System provides the foundation for creating your company's virtual world.

► BUSINESS CHALLENGE

Collecting, storing, and transforming asset data into valuable real-time operational insights is a challenge that companies must address in order to remain competitive. The pace of business innovation and improvement is accelerating every year. Companies that have positioned themselves to operate in real time with fact-based decision-making are disrupting even the most established markets. It is true that all businesses produce two things, a product or service and data. Harvesting data and turning it into actionable insights is now an imperative. Canary Labs has been helping companies meet this challenge for almost 40 years through the ongoing development and delivery of the **Canary System**. In this article, we will provide an overview of the **Canary System** and how it is designed to provide you with the ability to virtualize your world.

► CANARY SYSTEM OVERVIEW

The **Canary System** is one of the highest-performing real-time data collection, storage, analysis, and delivery solutions in the world. It is comprised of multiple components that work seamlessly together to enable you to gain both real-time and historical insights into the performance of your equipment and processes.

The **Canary Historian** is the heart of the **Canary System**. It can efficiently read, store, and write millions of data points at unparalleled speeds. We make collecting data easy by providing you with our suite of **Data Collectors** and our **Store & Forward** service. Just select and configure the collectors you need to start collecting data. As you begin collecting data you will quickly discover that industrial data tag names can be very eclectic. Equipment is often acquired from multiple vendors who may have implemented different control systems and tag naming conventions. It can be a challenge to bring these disparate data sources together into a common view. Fortunately, Canary decided to meet this challenge head-on and developed an innovative solution called **Canary Views**. **Canary Views** are configured to create a virtual view of the underlying data stored in the **Canary Historian**.

CHALLENGE

Overcoming the disparate nature of industrial data to provide users with well-structured and meaningful data for analysis and monitoring can be a challenge.

SOLUTION

Leveraging Canary Views to configure virtual views of the data you collect can help overcome this challenge.

ADVANTAGES

- Rule Based Models that can automatically discover and generate virtual tags and assets.
- Ability to create multiple views of your data with different structures and contexts.
- Ability to create asset-relative graphical displays that automatically detect and update when new tags or assets are added.

Canary Views provide Canary clients with well-structured and meaningful tag names and asset context to navigate and discover the assets and data they need. To maximize the value of data, it must be transformed into actionable insights. This is where the **Canary Calculations & Events** service shines. You can use the **Canary Calcs & Events Administrator** to configure calculations, aggregations, roll-ups, and events based on conditions you define and configure. Use them to detect downtime, process or equipment operating excursions, total up-time, production counts, rejects, operating limits, KPIs, and many other valuable performance metrics.

Data and insights aren't valuable until they are shared and acted upon. At Canary, we value collaboration and interoperability. This philosophy permeates our entire organization and the products and services we deliver. So, we make it our mission to enable you to openly share your data with other users and 3rd party tools. First, we empower your workforce by providing unlimited use of **Axiom** our easy-to-use graphical dash-boarding solution. With it, you can easily configure dashboards and reports to deliver operational insights to those who can act. It's all HTML5-based, so you can access your dashboards from any device that supports a modern web browser. Next, we provide our Excel Add-In for those who prefer to work with spreadsheets. Just select the raw data or aggregated data you want and leverage the extensive capabilities of Excel to do the rest.

If you need to share data with other platforms or solutions, we provide a suite of data delivery solutions we call **Canary Connectors**. Our **MQTT Sparkplug Publishing Client** is the perfect solution for streaming Canary data to MQTT brokers and cloud services like Microsoft Azure or Google Cloud. Need to connect through a Web API? Then the **Canary Web API** makes it possible. Have a favorite Business Intelligence or Analytics application? Put the **Canary ODBC Connector** to work. Want to exchange data with your own software applications? Then the **Canary .Net API** might be your answer.

As you can see, the **Canary System** is more than just a Data Historian or a streaming data storage solution. It's a collection of components that have been developed to easily deliver real-time operational insights at a price you can afford. In fact, you really can't afford not to get started on your digital journey. Now that you know what the Canary System is, let's review the steps you will need to take to Virtualize Your World.

▶ COLLECT YOUR DATA

It all starts with collecting data. Fortunately, Canary provides a suite of **Canary Data Collectors** that enable you to collect data from almost any type of data source. At Canary we value openness. Openness with ourselves, our customers, our partners, and our solutions. So, naturally, we embrace open standards wherever possible. We provide Canary collectors that meet OPC DA, OPC UA, and MQTT SparkplugB standards. We also help propel these standards forward by participating on their technical review boards. You can leverage these three collectors to collect data from thousands of various third-party data collection servers, drivers, and adapters that have been developed to exchange data with almost any system.

Many of our customers have chosen to implement the **Canary System** to supplement or replace less capable historians or to consolidate their data into an **Enterprise Canary Historian** to share it freely across their company.

For even tighter integration we provide purpose-built collectors for the following SCADA systems:

- Ignition by Inductive Automation
- CygNet by Weatherford
- FrameworX by Tatsoft

We also offer our MS SQL and CSV collectors for those who need to access data stored in a relational database table or delimited data file. If you need to share data over the internet, then our Canary Web Service API may be your answer. Lastly, you can use our full-featured .Net API library to exchange data from within your applications. The Canary System is an open system that enables you to collect data from almost any data source.

▶ MAKING SENSE OF YOUR DATA

Collecting data is one thing, but making sense of it is another. Industrial data can be collected from many different data sources, all of which may have different tag naming conventions. Dealing with tag naming variation can be a challenging task. Over the years several different approaches have been tried. Some have tried to standardize and enforce tag naming conventions on the source systems. Admirable, but difficult since it requires significant coordination across various vendors and engineers resulting in longer project timelines, higher costs, and vendor support.

Others try to enforce a tag naming standard on the historian data tags. This forces you into a single naming structure and requires you to translate the source tag names before you begin collecting valuable data. This approach often begins to break down over time due to the manual process, change, and unforeseen needs and requirements.

At Canary we considered these and other options and found them lacking, that's why we developed **Canary Views**. **Canary Views** enables you to simply connect and collect data tags from multiple data sources while retaining the source system data tag names. This eliminates the overhead of trying to force OEM's, System Integrators, and automation engineers to comply with a single naming standard or convention. No waiting, just connect and collect. **Canary Views** allow you to create virtualized views of your data after it is collected.

▶ CREATE YOUR VIEW

The **Canary Views Administrator** is used to configure virtual views that reshape and add context to the data stored in the **Canary Historian**. **Canary Views** are defined by a set of View Rules that you configure to alias tag names, create and assign asset types, and establish parent/child relationships between assets you define. Rules are written as Regular Expressions (Regex). A regular expression is a sequence of characters that specify matching patterns in text. Regex rules support "find" and "find and replace" operations that enable you to transform your source data tags into a more structured and user-friendly virtualized view. There are four types of view rules: Model Rules, Asset Rules, Parent-Child Rules, and Copy Rules. Model Rules are applied to decode and reshape the source tag names into a more structured and meaningful view tag. With Regex, you can extract, rearrange, or replace source tag name text. View tags can provide additional context when they incorporate a hierarchical structure.

This structure enables the creation of parent/child relationships between elements (Assets) that facilitate easy navigation. You can just add a "." period to delimit each level of your hierarchy. For instance, one recent client used an alphanumeric code at the end of tag names to represent the type of asset the tag was associated with, as well as the physical location of the asset.

They created Model Rules to create a virtual tag that replaced the alphanumeric code with common names. So, a source tag named "24TE_1220C_Comp_Outboard" in the historian can also be found within a Canary View as "Lake Charles.Compressor1220C.Outboard"

Next, you define Asset Rules to define an Asset Type for each level defined by the Model Rules. Asset Types may represent physical assets, geographic areas, business units, or any other logical element defined by your hierarchy. In our example, you could create an Asset Rule to name the first segment of the virtual tag to be an Asset Type = "Site" and another Asset Rule to name the second segment to be an Asset Type = "Unit". Each occurrence of an asset type in a view is called an Asset Instance. You can have multiple instances of an asset.

MATCH	REPLACE	ASSET TYPE	MATCHED	DUPLICATES	INSTANCES	EXCLUDE	TIME (MS)
1	HL	H	1490	0	0	<input type="checkbox"/>	807
2	HL_P1E_EXHPHP(PNPPPPK)		275	0	0	<input checked="" type="checkbox"/>	529
3	1*+1(-L+R)	\$132.53	1275	0	0	<input type="checkbox"/>	1716
4	\\WM\.	Gas Meter	682	0	0	<input type="checkbox"/>	2211
5	\\FUEL_GAR	Fuel Gas Meter	28	0	0	<input type="checkbox"/>	102
6	\\LMB	Oil Meter	172	0	0	<input type="checkbox"/>	151
7	\\WML	Water Meter	172	0	0	<input type="checkbox"/>	185
8	\\ALL	Artificial LPL	381	0	0	<input type="checkbox"/>	235
9	1+1%	Rule	1275	0	4	<input type="checkbox"/>	514
10	1*+1303	Well	1275	0	43	<input type="checkbox"/>	415

In our example, you could have multiple sites (Lake Charles, Houston, Bakersfield) and each site could have multiple Assets, for example, (Compressors, Chillers, Pumps). If you have multiple instances of the same Asset Type then they can be incremented, for example, Compressor01 and Compressor02. Asset Rules allow you to group common tags based on the asset they represent. For example, if a group of 60 sensors all belong to a compressor you can organize them into an asset called a "Compressor". An asset can have subgroups allowing you to designate assets within an asset. For instance, a compressor may have a group of tags that represent an interstage cooler, a water pump, and a motor. These rules can be applied universally to create hundreds of assets without requiring hours of work. Once you have defined your assets you can add Parent/Child Rules to duplicate an asset that is a child of multiple parent assets.

For example, a conveyor that is shared between two packaging machines can be assigned to the same parent duplicating an asset that is a child of multiple parent assets. You can use a Copy Rule if you want to copy a branch of tags from one section of the hierarchy to another. For example, a conveyor that is shared between two packaging machines can be assigned to the same parent, duplicating an asset that is a child of multiple parent assets.

▶ SHARE YOUR VIEW

Once you have created the “Perfect View” you will want to share it with others. **Axiom** is an HTML5 Web-based client application that allows you to configure and share graphical displays based on the **Canary Views** that you have created. Axiom application screens can be configured to be asset-relative by assigning an **Asset View** for the display you wish to build. **Axiom** provides a library of graphical controls that can be configured to display data in various trends, charts, gauges, grids, and value boxes. You can use the Asset Template control to create predefined displays for specific asset types. You can add and configure other controls to display relevant data, aggregates, calculated values, and metrics. The Asset Label control can be configured to enable the user to navigate and select a specific asset to display. Users can also apply filter expressions to select specific assets to display based on defined conditions. For example, display the assets with current downtime greater than one hour or display the assets with the top 5 downtimes.

The greatest advantage of asset relative displays is that they monitor the underlying Asset View updates and changes. When new tags or assets are generated by the View, they are automatically added to the

Axiom Asset Relative display. No manual maintenance is required. This unique feature is tremendously valuable when you have large numbers of assets and are adding additional assets over time.

With Canary Views and Axiom displays you're in control. You can configure your data, views, and displays to adapt to your organization and specific needs. We make it easy for you to monitor and manage industrial processes by providing clear and organized data visualizations.

▶ CANARY ADVANTAGES

- A unified platform for the secure collection, storage, contextualization, and analysis of process data
- Flexible architecture and deployment
- Cost-effective entry and scalability
- Rule-Based data modeling and templating for asset auto discovery
- Virtual views of the historian enable a custom tag naming convention, logical hierarchy, asset structure, and context to meet the needs of each client.
- Purpose-built data Views can be created meet a specific user needs. A users asset view can be restricted to only provide visibility into the specific assets that are required.
- Canary Views can be created from multiple underlying Canary Historians and Historian Data Sets.

“
Canary Software Is Very Easy To Use And Very Intuitive; We Use It Throughout The Company, From Operations To Administration
”

MIKE TUFTS

SCADA SUPERVISOR - CITY OF BOCA RATON

- View hierarchy. Canary can create Views from another View. For example, one view could establish a unified name space, while a second view built upon the first establishes an asset model.
- Asset Relative Axiom display generation based on predefined Asset Templates that automatically update when a new asset is selected or when a new asset is generated by the underlying View. No manual updates or edits are required.

▶ SUMMARY

Regardless of the industry, it is of vital importance to develop a Digital Strategy to define how you can collect and leverage the data that your physical assets generate. Continuous improvement, process optimization, productivity, efficiency, quality, equipment reliability, health & safety, and emissions are all subject to the health of your equipment and processes. Don't settle with chaos. Get started today with the Canary System.



ABOUT THE AUTHOR

Russ Gregg - *Director of Manufacturing Solutions*

Russ has almost 40 years of experience in manufacturing, spanning multiple engineering, information service, and technical leadership roles. At Canary, Russ focuses on the Canary Product Roadmap and assisting Customers through engagement and education. **Connect with Russ:** rgregg@canarylabs.com

ABOUT CANARY

Founded in 1985 with a focus to develop solutions from the end user's perspective, we have achieved more than 20,000 installations in over 70 countries. Our clients represent private, public, and government entities in all major industries.

HELPFUL LINKS

[Contact Us](#)

[Learn More](#)

[Canary System Overview](#)

