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Ignition by inductive automation

Ignition SCADA for Water/Wastewater

An Introduction to Inductive Automation's Ignition software

Presented By: Matt Furman & Todd Morrison of Results Engineering, Inc.

Date: 2/6/2018

Results Engineering, Inc.

- Located in Saco and Bangor, Maine
- In business since 1988
- Serving customers in:
  - Water/Wastewater
  - Manufacturing
  - Pulp & Paper
    - Burner Management Systems
    - Material Handling
    - Non-wovens
- Services offered include:
  - Electrical and controls engineering
  - Controls integration
  - Information technology for manufacturing

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Key Points

- Ignition is a powerful, flexible, and affordable solution for plants, business, and industry
- Results Engineering, Inc. is a certified Ignition integrator with many successful installations in Maine

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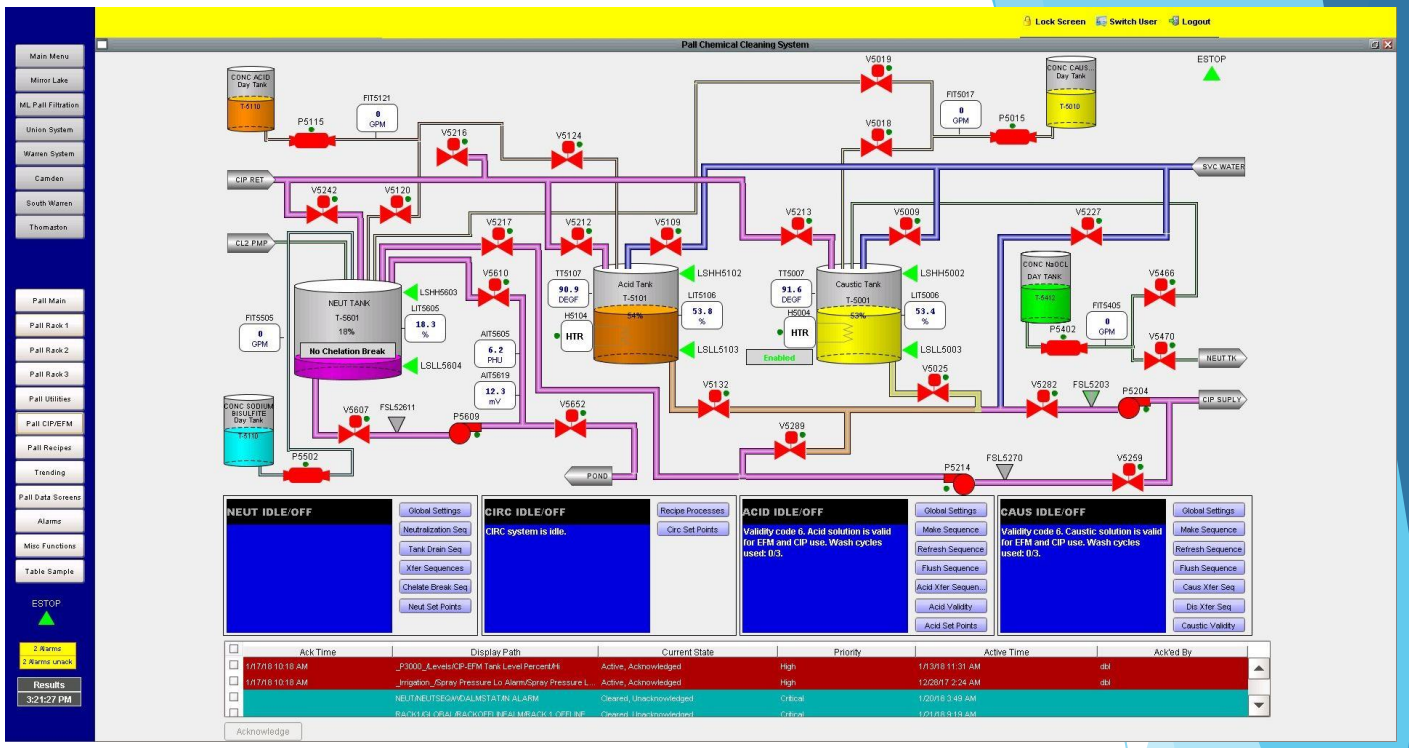
What is SCADA?



- SCADA system:
  - Supervisory Control and Data Acquistion
  - The interface that an operator uses to see and control equipment and processes
  - The software and computer hardware that monitors, gathers, and processes real-time data
  - Interact directly with devices such as instruments, pumps, or valves through Human-Machine Interface (HMI) software

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What is Ignition?

- Similar in some ways to other SCADA systems
  - Lookout by National Instruments
  - VTScada by Trihedral
  - FactoryTalk View by Rockwell
  - iFIX by GE
- Most other SCADA systems were developed 20+ years ago when technology was very different. Security, remote access, ease of access, and other topics weren't as important.

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Why is it Better?

- “The New SCADA”
- Ignition is an industrial automation software platform that many businesses and organizations have switched to for their HMI/SCADA needs.
- Installed in over ten thousand locations in over 80 countries
- Industry-leading tech support and training – free support for integrators
- Integrator Certification Program
- Its licensing model lets users pay a flat fee based on number of servers instead of by the client or tag.
- Web-based: It can be downloaded and installed in a few minutes, and clients can be launched or updated instantly.

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Some Advantages to Ignition

- Ignition allows unlimited tags, clients, and connections under one license
- And because you pay only for the modules you need, you're not wasting money on bonus features you'll never use
- Can be set up on a cloud network or a local network
- Can be launched on any computer or device with a web browser, such as smartphones and tablets
- Makes for a mobile and accessible SCADA system
  - Flexible
  - Productive

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Ignition Basics

- Install it in a single place, does not need to be “server” class
  - Single location to configure your project(s)
- Web-based
  - Can access anywhere you have a web browser (Chrome, Internet Explorer, Firefox, Safari, etc.)
  - Runtimes (or clients) can be accessed with PCs, smartphones, tablets, etc.
  - Updates are sent automatically to those open clients

Ignition Basics

- Cross-platform
  - Windows
  - Linux
  - Mac

- Built entirely on JAVA programming language and JPython
- Minimum requirements to run it:
  - Java SE8 (server) & Java SE 6, 7, or 8 (client)
  - Dual-core processor (32 or 64 bit)
  - 4 GB RAM
  - 10 GB free hard drive space

Ignition is Modular

Image Source: www.inductiveautomation.com

- You can choose modules based on plant SCADA needs – add them as needed like apps on a smartphone
- Built in Java so it can run in any operating system
- Everything works together seamlessly through the single designer interface
- Add, change, or remove components without impacting the rest of the system

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Modules OPC UA

Image Source: www.inductiveautomation.com

- Connects to most major PLCs
- Drivers include:
  - Modbus Ethernet
  - UDP and TCP (barcode scanners, analytical equipment, etc)
  - Allen-Bradley
  - Siemens
  - And most others

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Modules SQL Bridge

Image Source: www.inductiveautomation.com

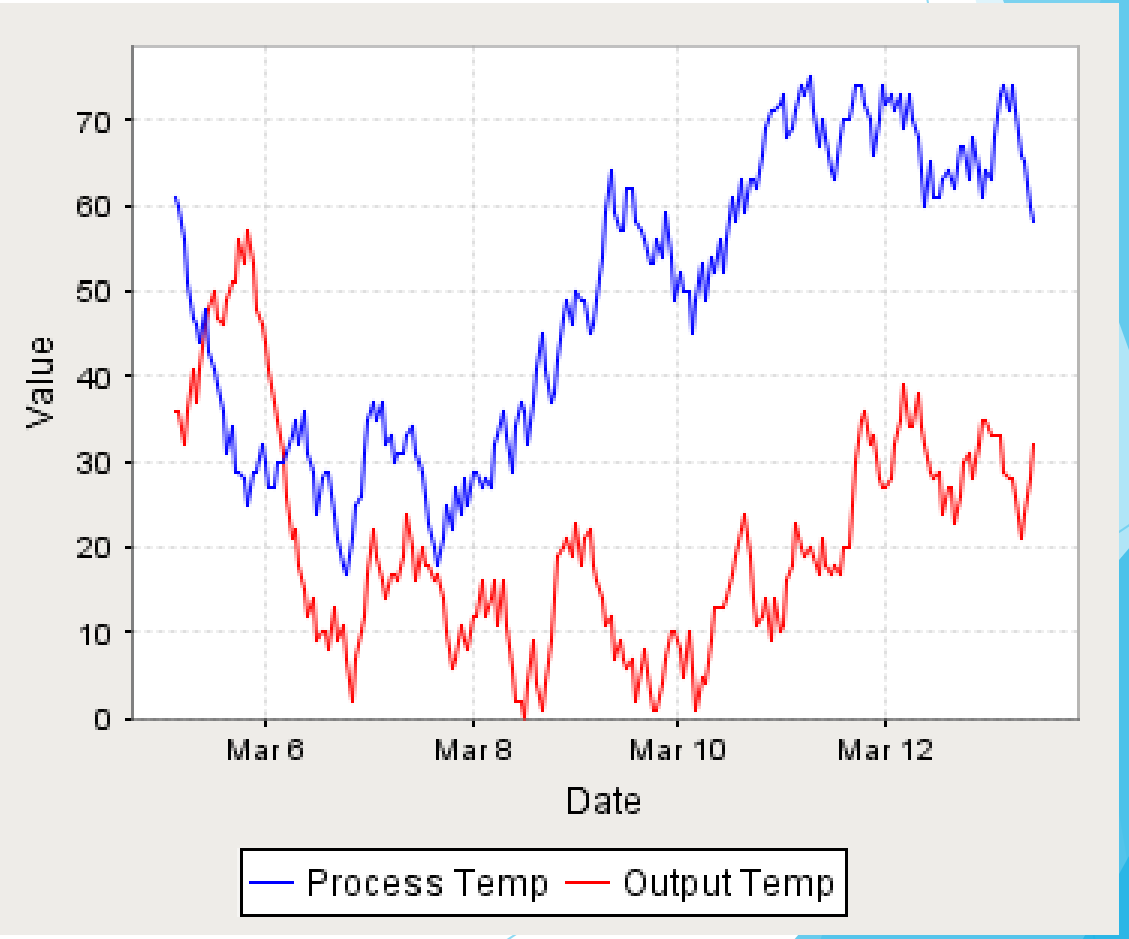
- Can move data bidirectionally: PLC - SQL Bridge - Database
- Log large amounts of data easily
- Synchronize PLCs with databases
- Create recipe and batching systems
- Sequence entire processes
- Automatically creates tables, columns, etc.
- Supports MS SQL, Oracle, IBM DB2, MySQL, MariaDB, PostgreSQL, Firebird, Etc.

Modules

Tag Historian

Image Source: www.inductiveautomation.com

- Creates and manages tables for you – so you don't need to be knowledgeable about database management to use it
- Query the database through the Ignition Designer
- Combine with the Vision Module to make easy-to-use charts and trends



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Modules Vision

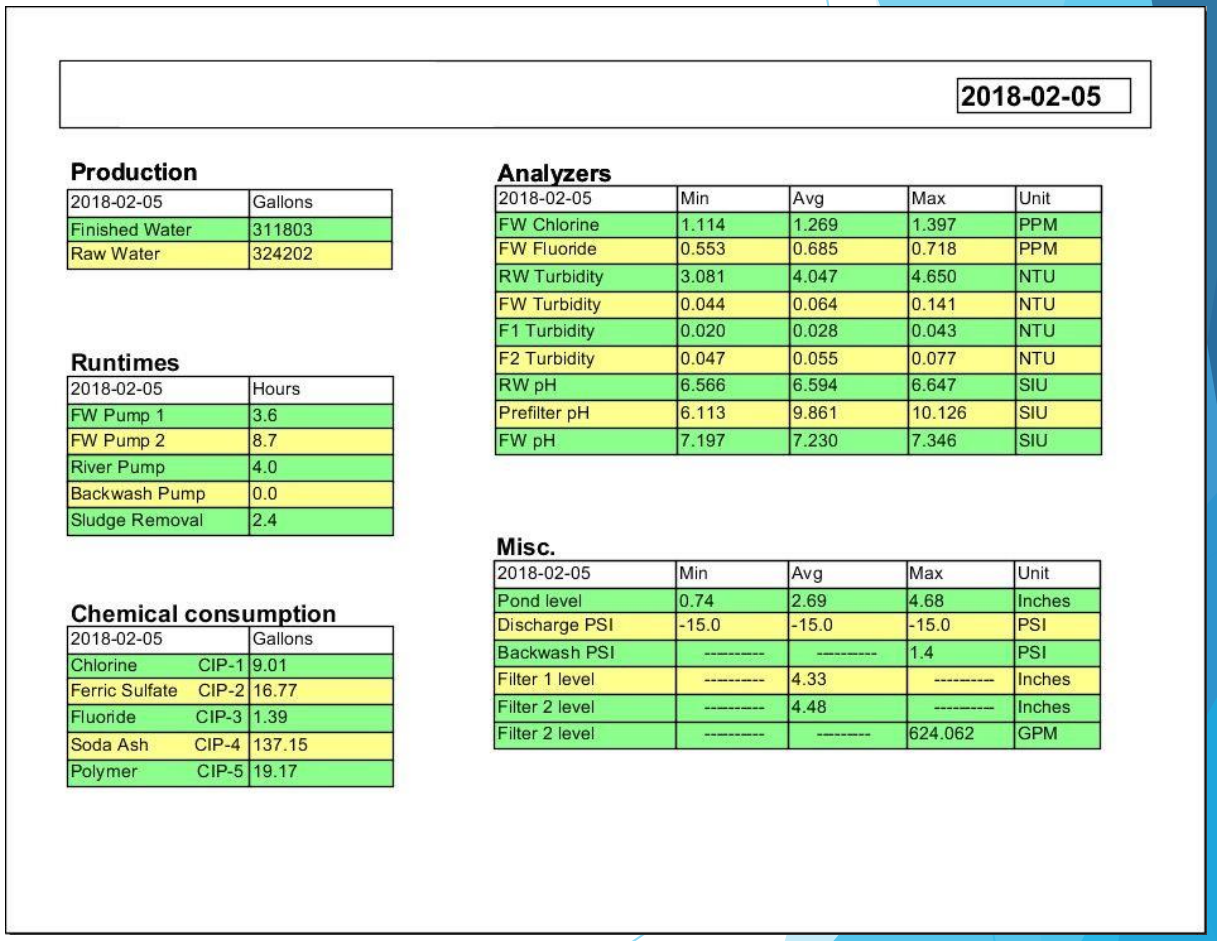
Image Source: www.inductiveautomation.com

- Up to 5 clients or unlimited clients
- This is the display front-end that you see
  - Graphics
  - Trends
  - Alarms
- Database front-end (write to database or display data from it)
- Use over 4,000 existing graphics or create your own using built-in tools
- Instantly updates all clients when changes are made to the project

Modules Reporting

Image Source: www.inductiveautomation.com

- Select data from multiple sources
- Design reports from within the Designer
- Schedule reports to run automatically
  - Based on time
  - Based on event such as shift change or tag change
- Print, send, or save automatically
- Use query tools



2018-02-05

Production

2018-02-05	Gallons
Finished Water	311803
Raw Water	324202

Runtimes

2018-02-05	Hours
FW Pump 1	3.6
FW Pump 2	8.7
River Pump	4.0
Backwash Pump	0.0
Sludge Removal	2.4

Chemical consumption

2018-02-05		Gallons
Chlorine	CIP-1	9.01
Ferric Sulfate	CIP-2	16.77
Fluoride	CIP-3	1.39
Soda Ash	CIP-4	137.15
Polymer	CIP-5	19.17

Analyzers

2018-02-05	Min	Avg	Max	Unit
FW Chlorine	1.114	1.269	1.397	PPM
FW Fluoride	0.553	0.685	0.718	PPM
RW Turbidity	3.081	4.047	4.650	NTU
FW Turbidity	0.044	0.064	0.141	NTU
F1 Turbidity	0.020	0.028	0.043	NTU
F2 Turbidity	0.047	0.055	0.077	NTU
RW pH	6.566	6.594	6.647	SIU
Prefilter pH	6.113	9.861	10.126	SIU
FW pH	7.197	7.230	7.346	SIU

Misc.

2018-02-05	Min	Avg	Max	Unit
Pond level	0.74	2.69	4.68	Inches
Discharge PSI	-15.0	-15.0	-15.0	PSI
Backwash PSI	---------	---------	1.4	PSI
Filter 1 level	---------	4.33	---------	Inches
Filter 2 level	---------	4.48	---------	Inches
Filter 2 level	---------	--------	624.062	GPM

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Modules Mobile

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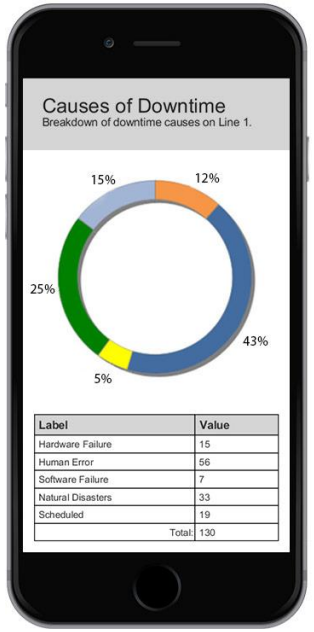

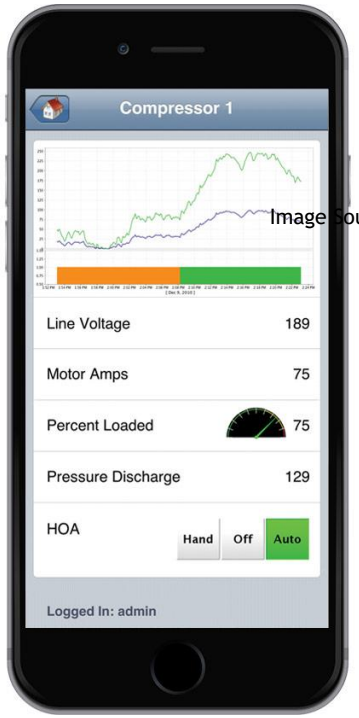

Image Source: www.inductiveautomation.com

- Access your plant in real-time, anywhere on a mobile device:
  - Android and iOS
- Any cell phone, tablet, or PDA with a modern web browser and Wi-Fi can display and interact with the same data that is viewed on the plant floor
- SSL encryption provides security
- Respond to alarms on your mobile device

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M

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- S
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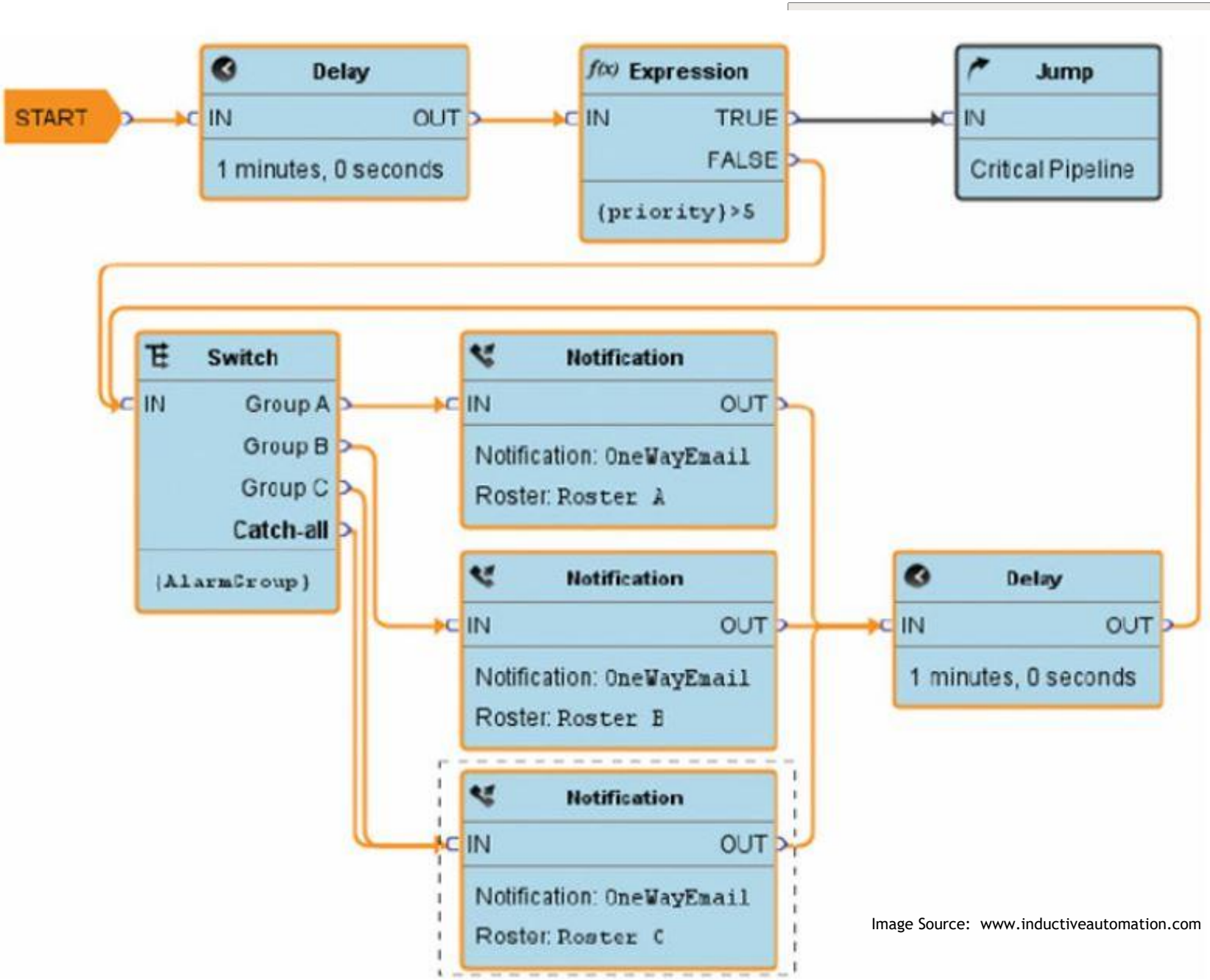
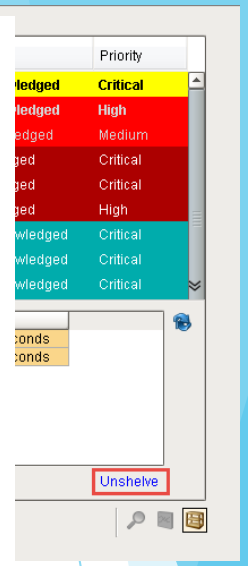
  -
  -
  -
- E

alarm

ropriate staff





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Modules Enterprise Administration

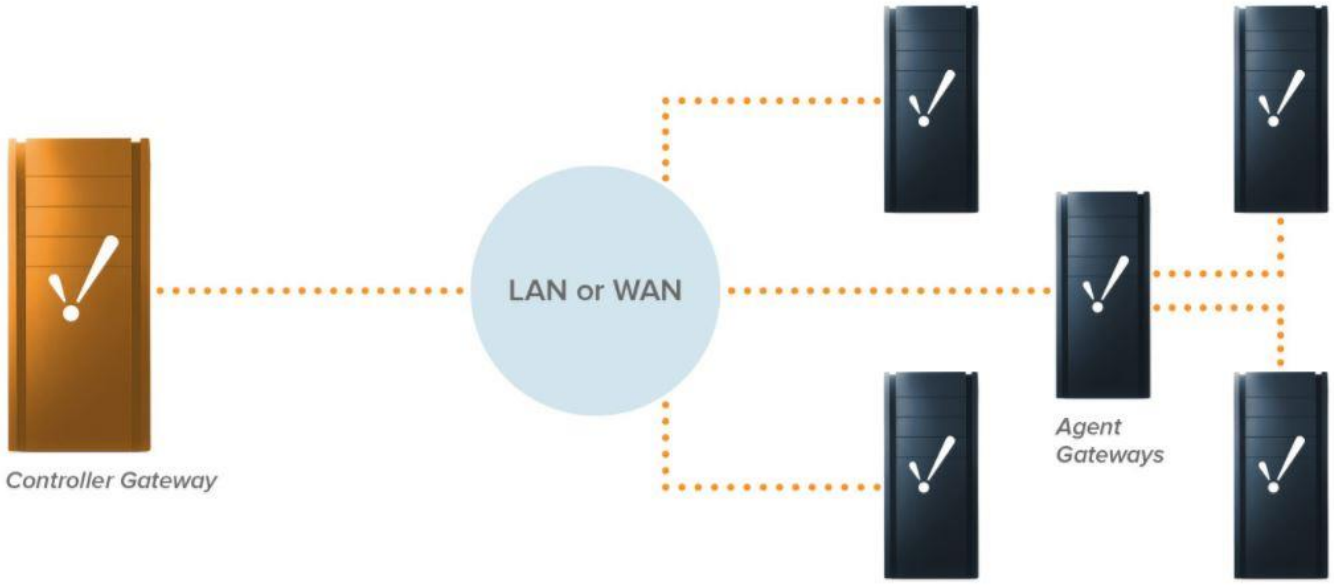

Image Source: www.inductiveautomation.com

- Provides a secure and intuitive way to manage many Ignition installations from one location
- Ideal for large enterprises with multiple sites and multiple Gateways
- Automated back-up
- Synchronize projects

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Ignition Architectures - Standard

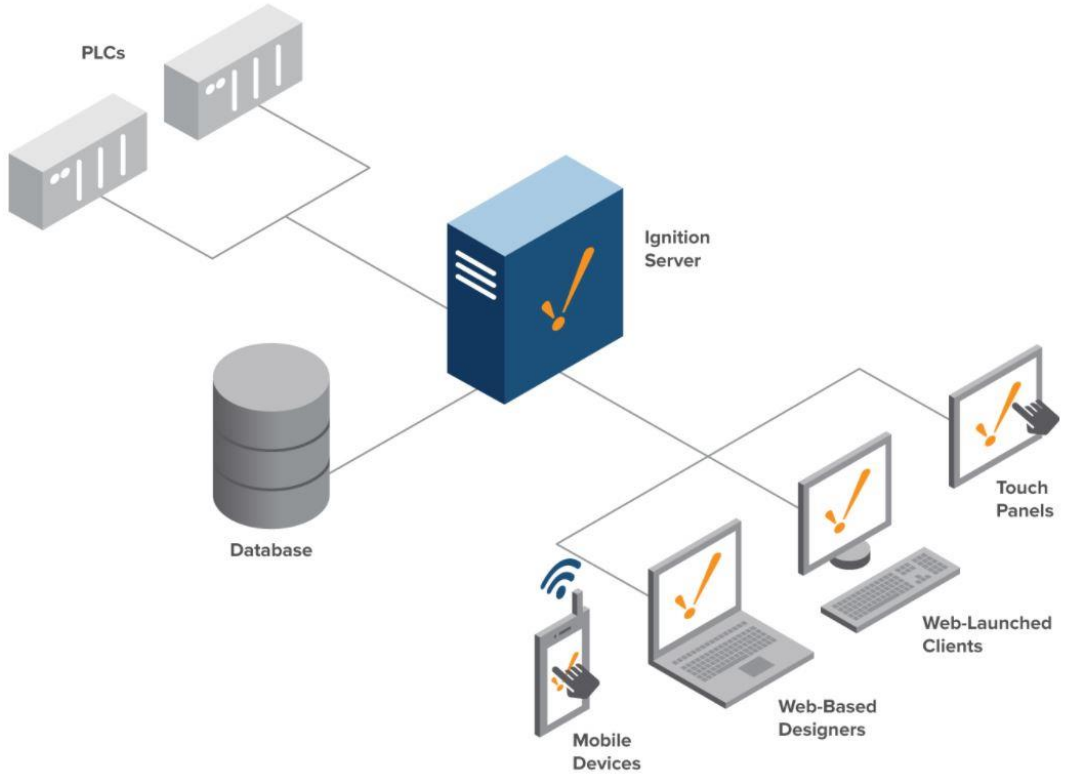

Image Source: www.inductiveautomation.com

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Ignition Architectures – Hub & Spoke

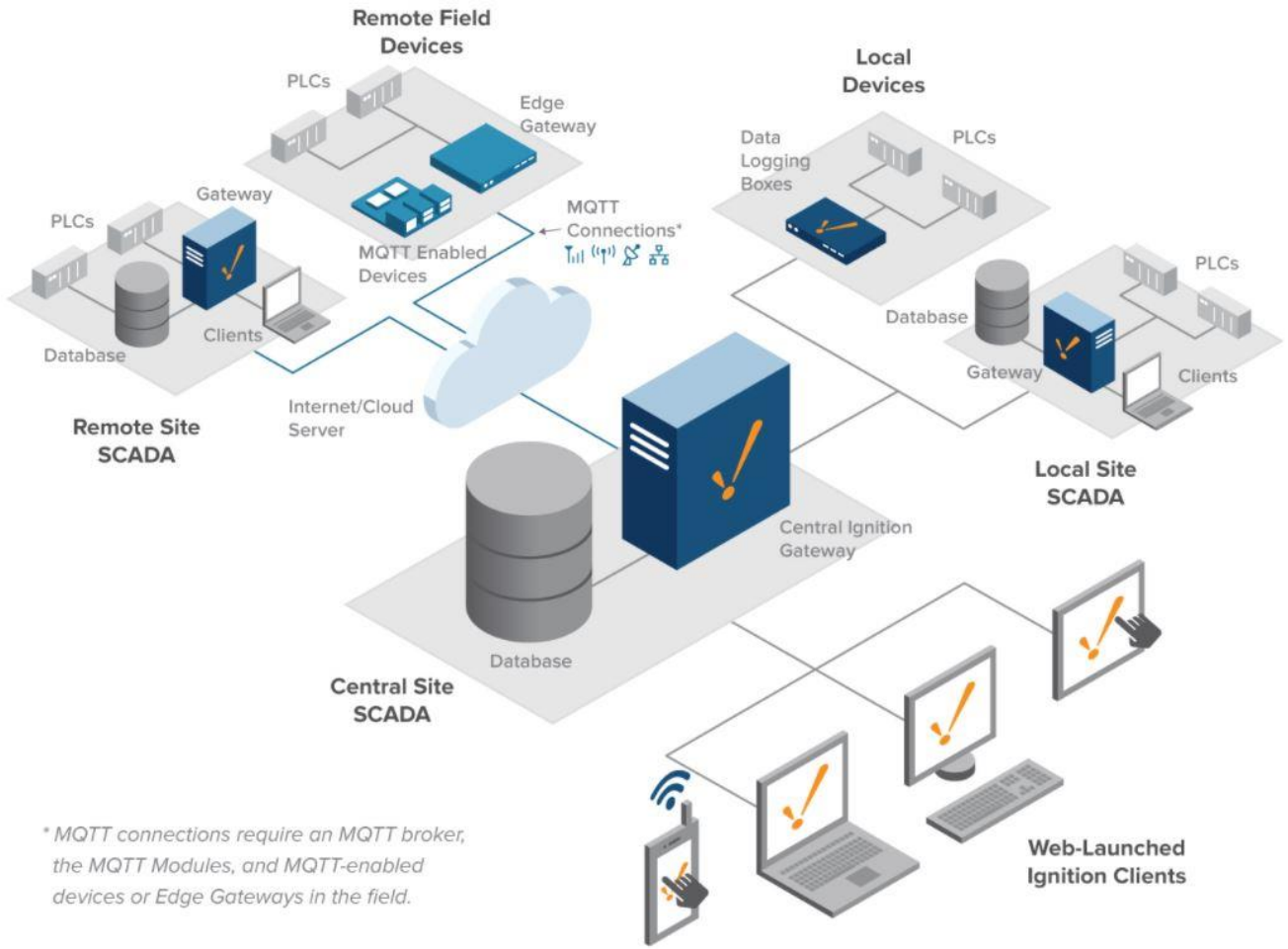

Image Source: www.inductiveautomation.com

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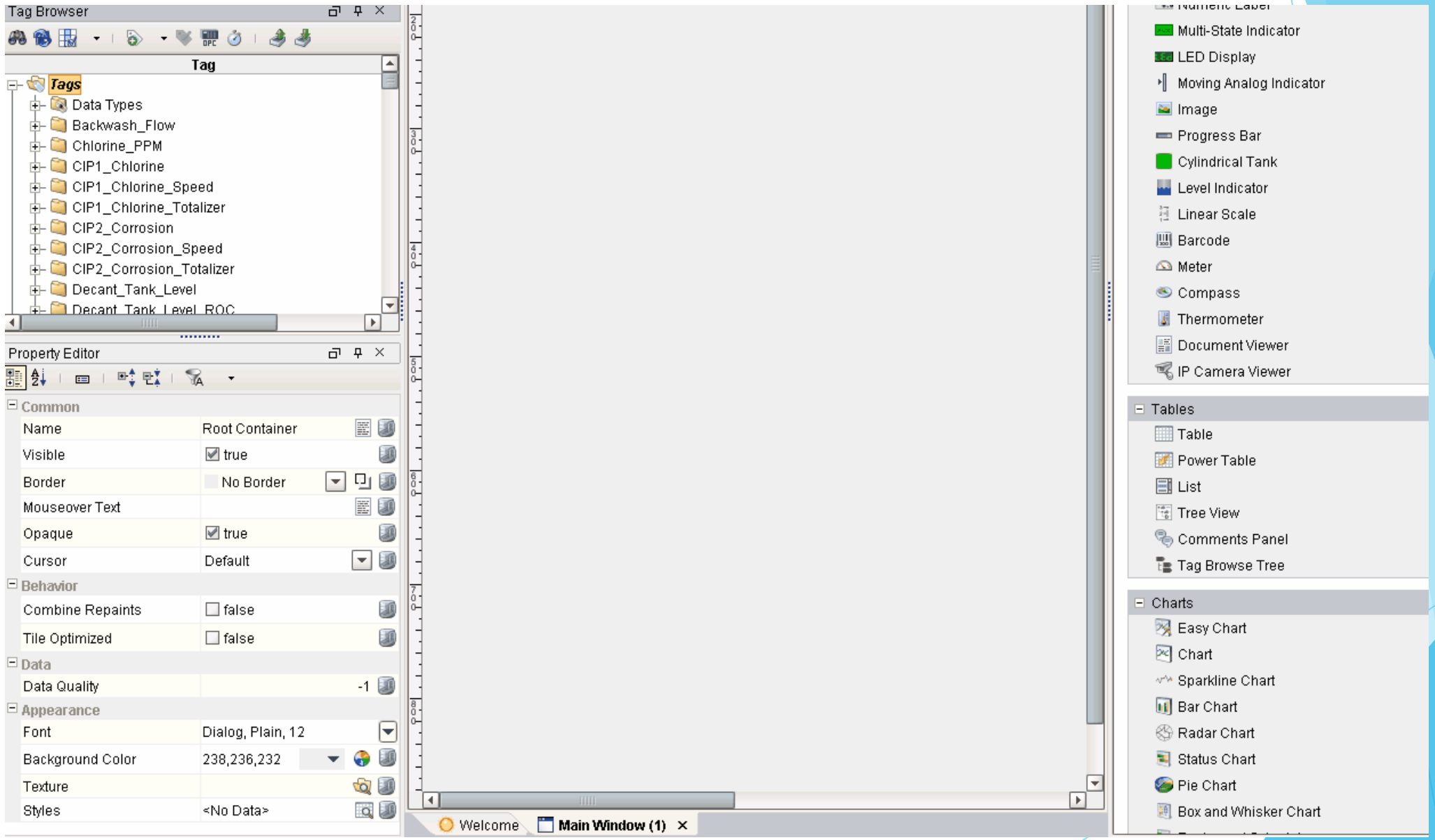
Rapid Installation & Development

- Ignition can be downloaded and deployed in minutes
- Multiple developers can work on the same project concurrently
- Don’t need to shutdown the system to make changes
- Changes are reflected instantly at all clients
- Some examples of ease of development…

Rapid Development Tools



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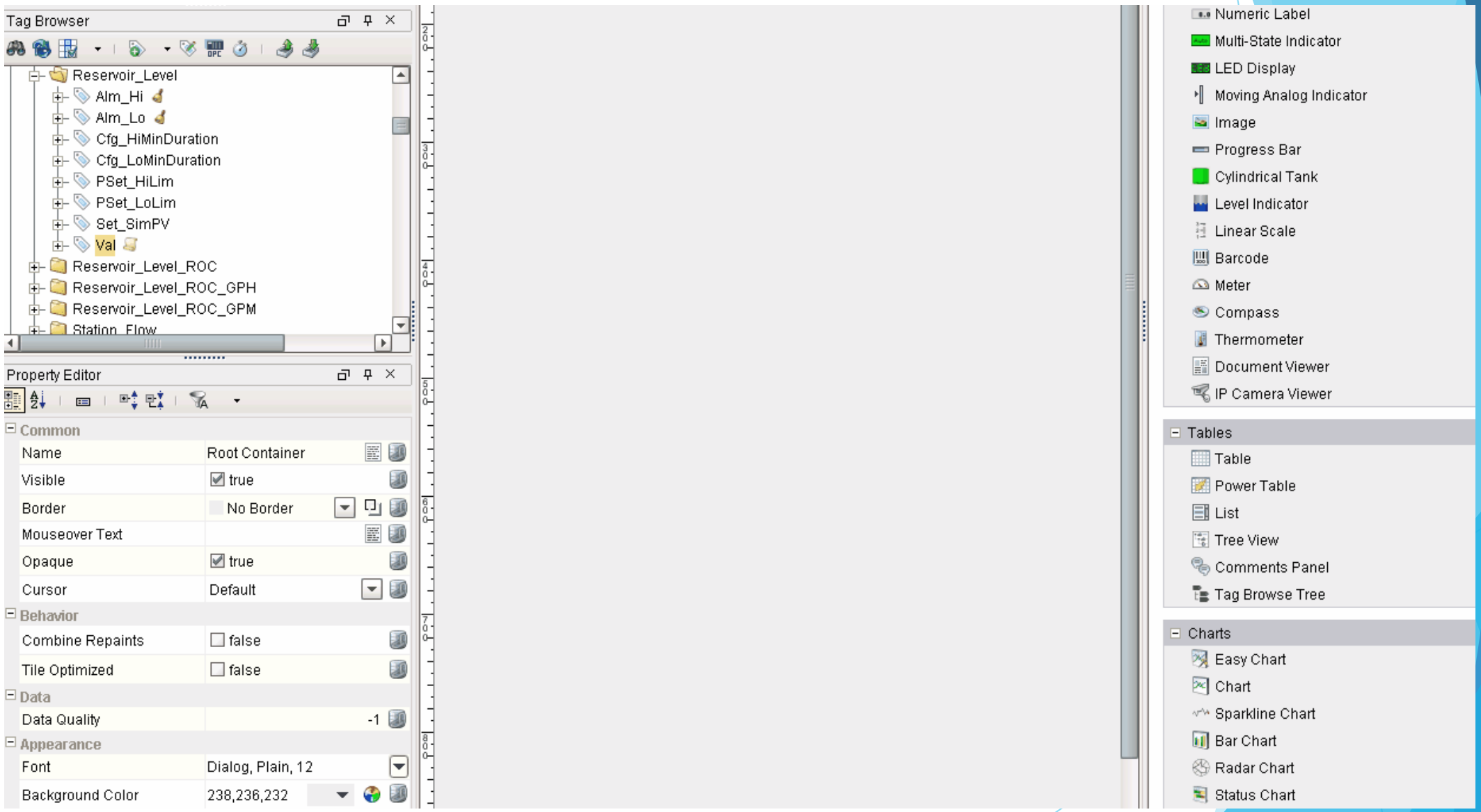
Quick Object Binding



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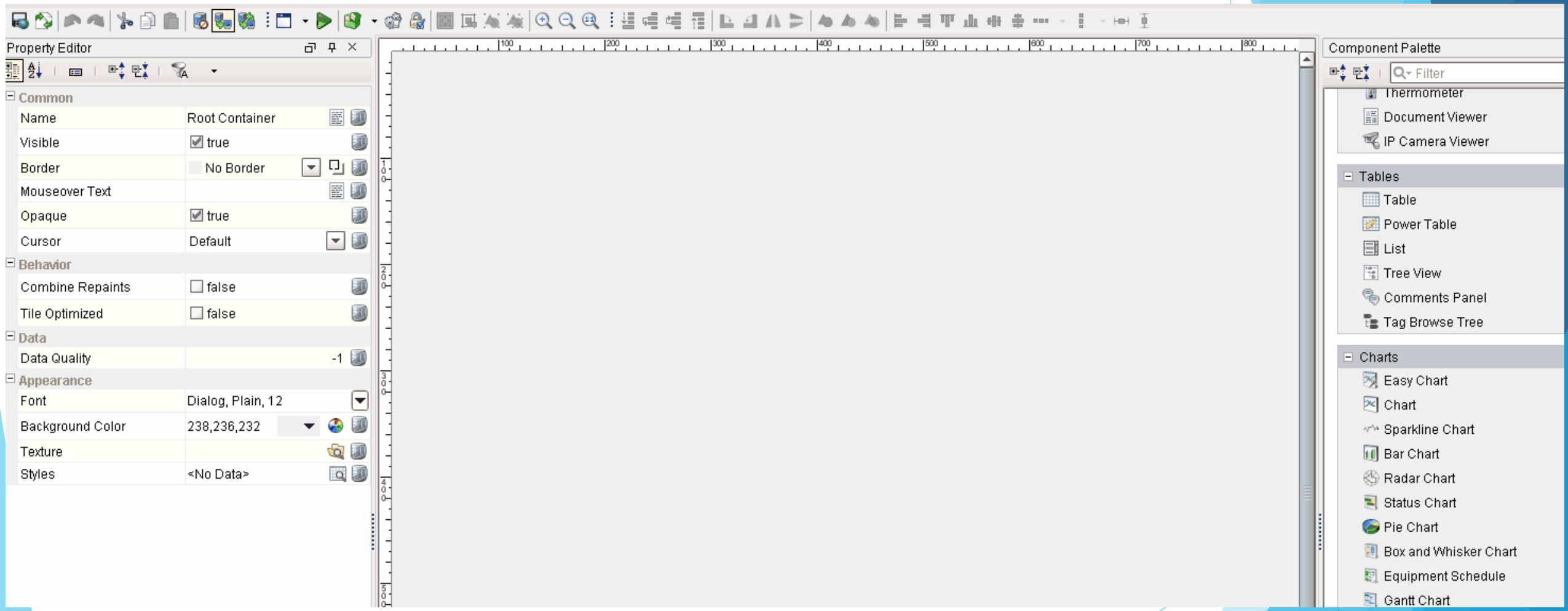
Ad-Hoc Trending



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Database-Friendly

- Ignition has pioneered the connection of databases with SCADA
- Allows unlimited database connections with most any type of database
- Seamless and easy to connect to a SQL database
- Makes it easy to gather all your data in one place
- Using a free version of MySQL and an Excel spreadsheet allows for an inexpensive and extremely powerful way to organize and access your data
- Or purchase the Reporting Module for an easier-to-develop and maintain, and aesthetically pleasing reporting tool

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Example Ignition Screens

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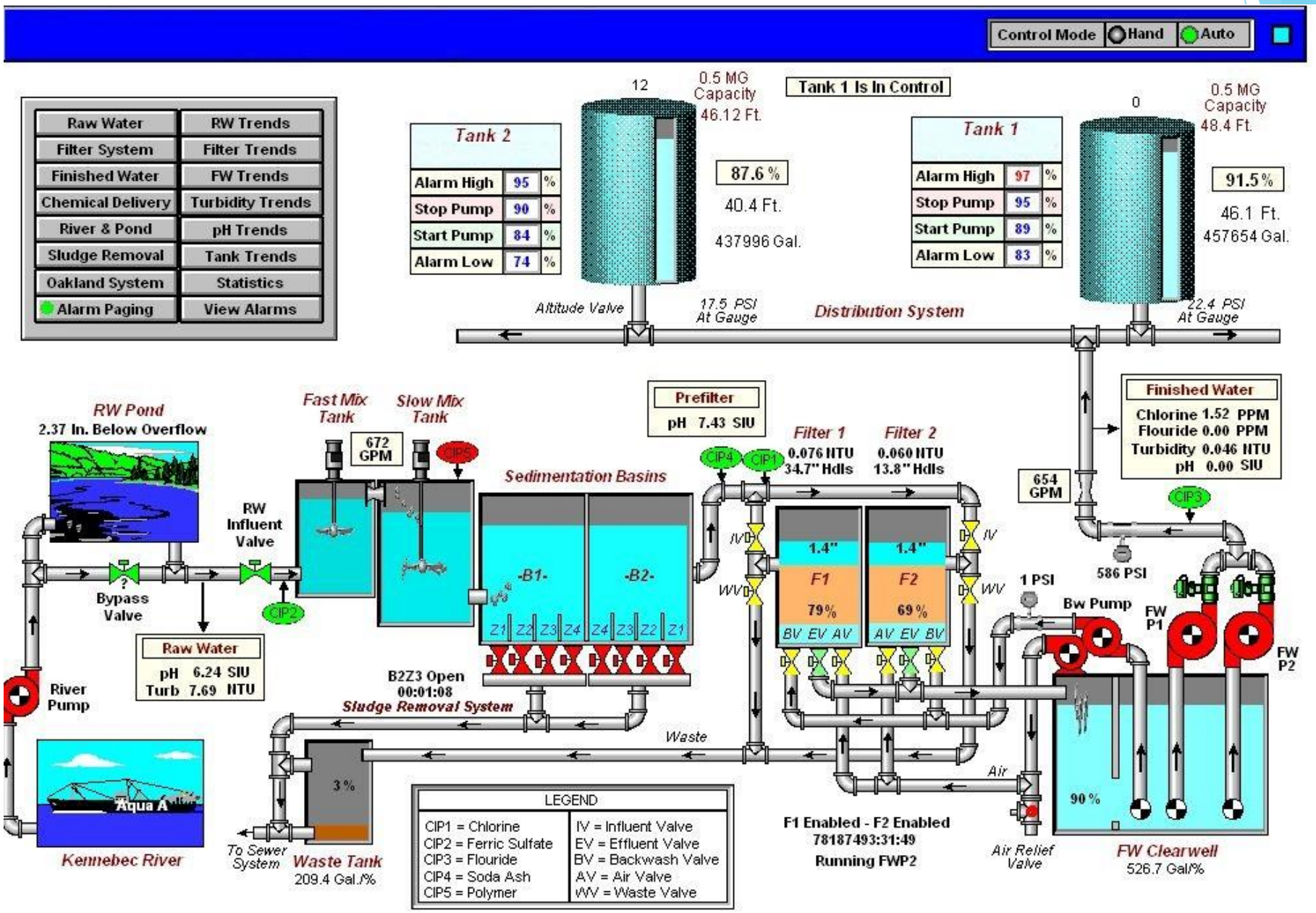
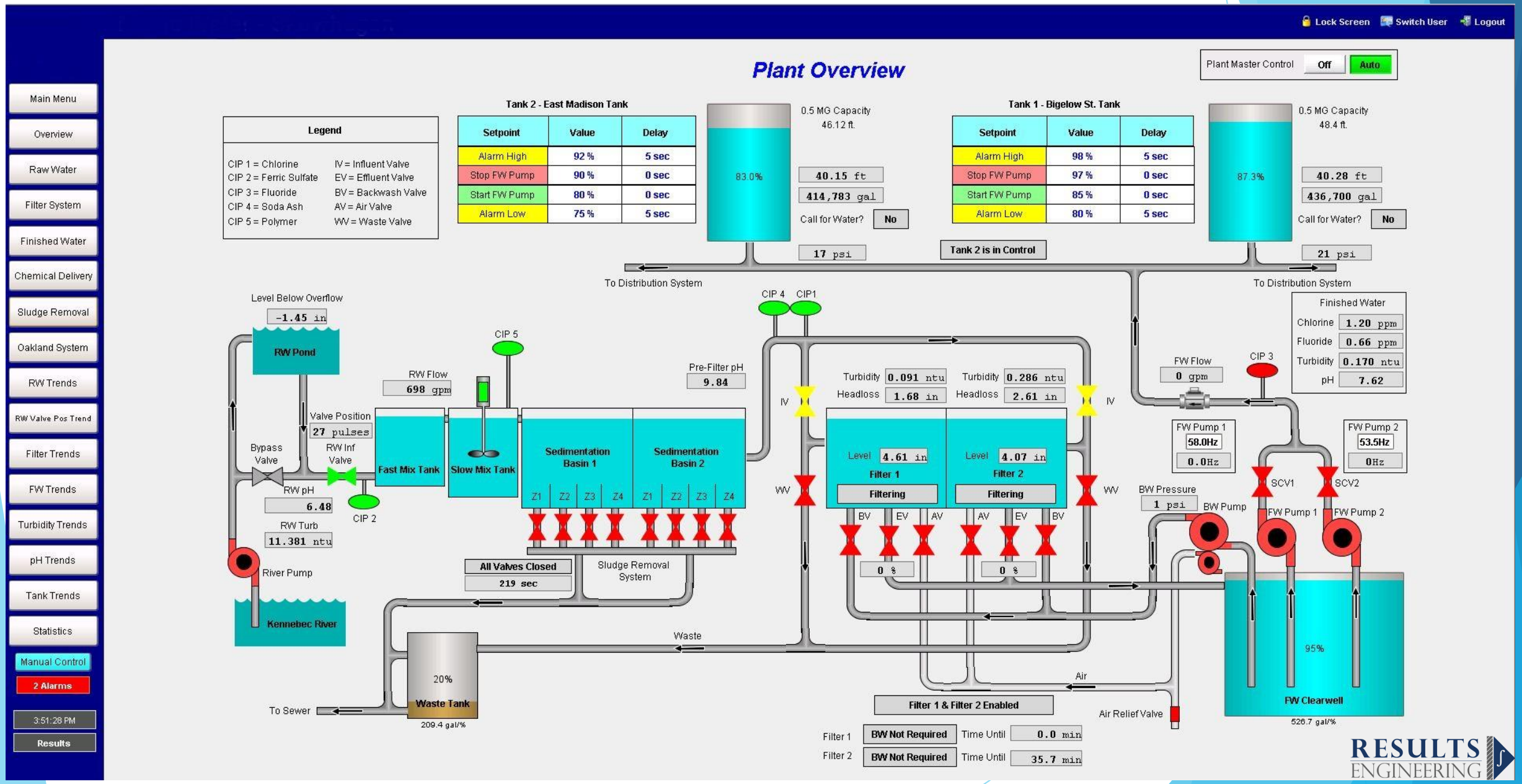
Before

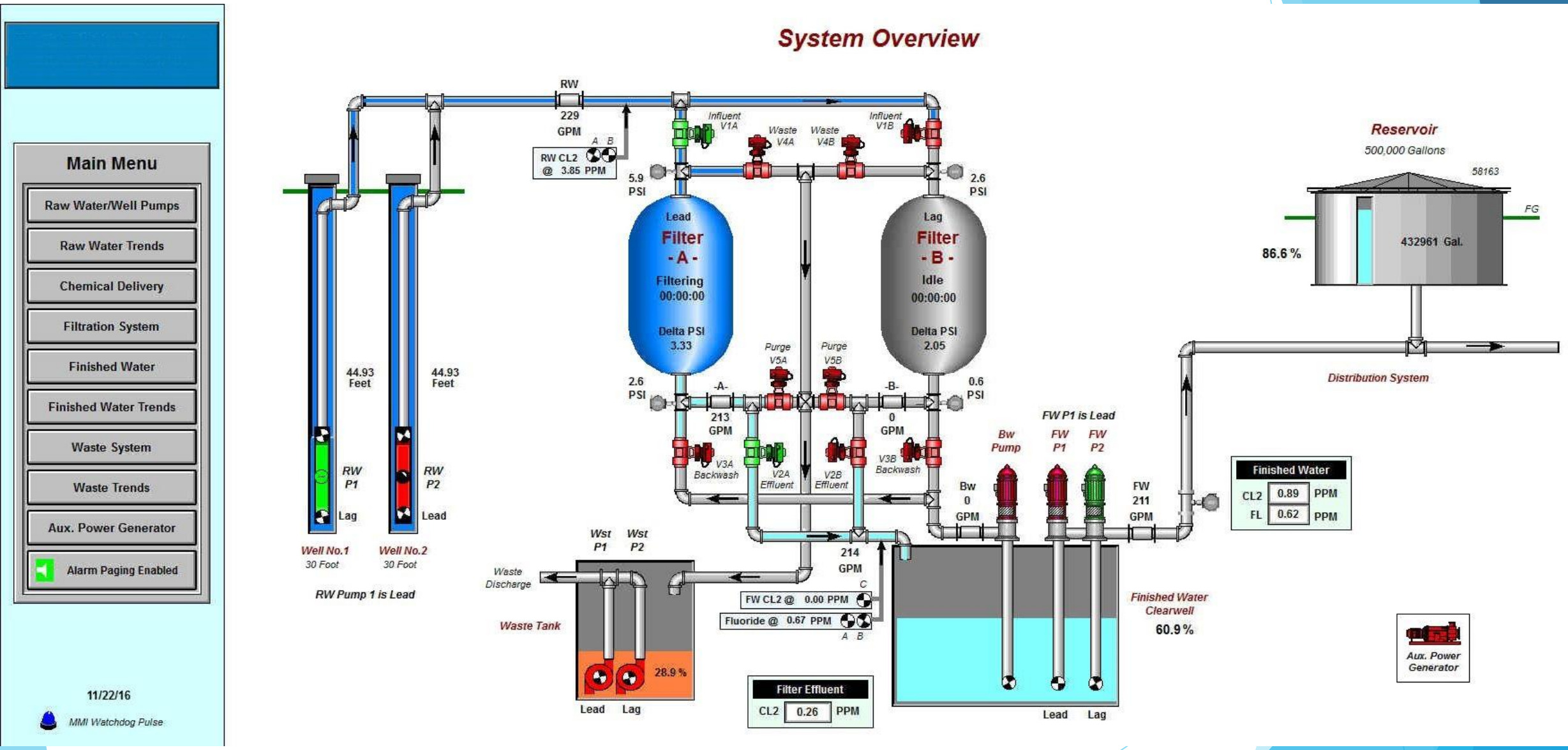

Control Mode
Hand
Auto
Raw Water
RW Trends
Filter System
Filter Trends
Finished Water
FW Trends
Chemical Delivery
Turbidity Trends
River & Pond
pH Trends
Sludge Removal
Tank Trends
Oakland System
Statistics
Alarm Paging
View Alarms
Tank 2
Alarm High 95 %
Stop Pump 90 %
Start Pump 84 %
Alarm Low 74 %
12
0.5 MG Capacity
46.12 Ft.
87.6 %
40.4 Ft.
437996 Gal.
Tank 1 Is In Control
Tank 1
Alarm High 97 %
Stop Pump 95 %
Start Pump 89 %
Alarm Low 83 %
0
0.5 MG Capacity
48.4 Ft.
91.5 %
46.1 Ft.
457654 Gal.
Altitude Valve
17.5 PSI At Gauge
Distribution System
22.4 PSI At Gauge
RW Pond
2.37 In. Below Overflow
Fast Mix Tank
Slow Mix Tank
672 GPM
CIP5
Sedimentation Basins
Prefilter
pH 7.43 SIU
Filter 1
0.076 NTU
34.7" Hdls
Filter 2
0.060 NTU
13.8" Hdls
CIP4
CIP1
Finished Water
Chlorine 1.52 PPM
Flouride 0.00 PPM
Turbidity 0.046 NTU
pH 0.00 SIU
654 GPM
CIP3
586 PSI
RW Influent Valve
Bypass Valve
CIP2
-B1-
-B2-
Z1 Z2 Z3 Z4
Z4 Z3 Z2 Z1
IV
WV
1.4"
F1
79%
BV EV AV
1.4"
F2
69%
AV EV BV
1 PSI
Bw Pump
FW P1
FW P2
Raw Water
pH 6.24 SIU
Turb 7.69 NTU
River Pump
B2Z3 Open
00:01:08
Sludge Removal System
Waste
Air
3 %
90 %
LEGEND
CIP1 = Chlorine
CIP2 = Ferric Sulfate
CIP3 = Flouride
CIP4 = Soda Ash
CIP5 = Polymer
IV = Influent Valve
EV = Effluent Valve
BV = Backwash Valve
AV = Air Valve
WV = Waste Valve
F1 Enabled - F2 Enabled
78187493:31:49
Running FWP2
Air Relief Valve
FW Clearwell
526.7 Gal/%
Kennebec River
To Sewer System
Waste Tank
209.4 Gal./%

After

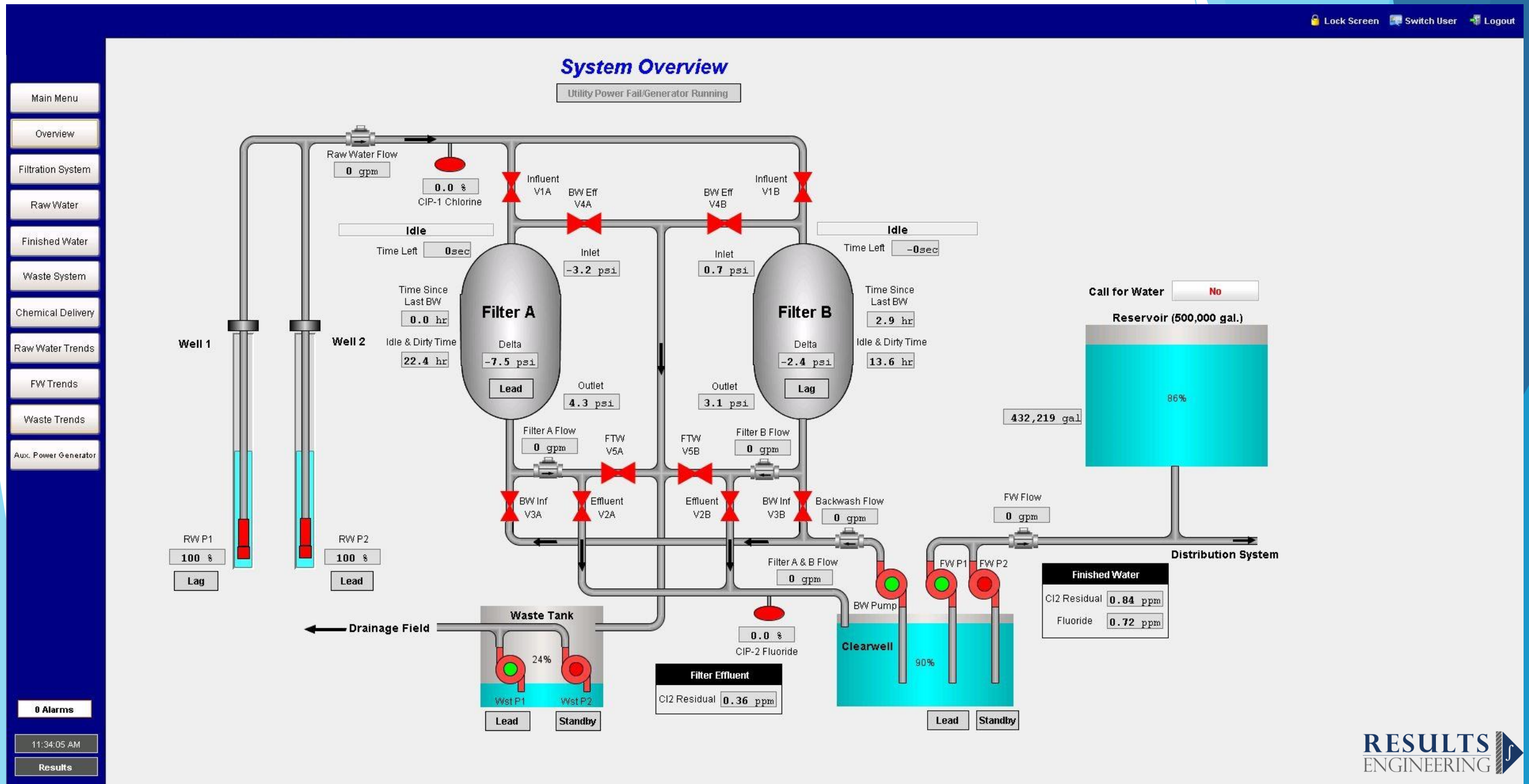


RESULTS ENGINEERING

Before


Main Menu
Raw Water/Well Pumps
Raw Water Trends
Chemical Delivery
Filtration System
Finished Water
Finished Water Trends
Waste System
Waste Trends
Aux. Power Generator
Alarm Paging Enabled
11/22/16
MMI Watchdog Pulse
System Overview
RW
229
GPM
A B
RW CL2
@ 3.85 PPM
Influent V1A
Waste V4A
Waste V4B
Influent V1B
5.9
PSI
2.6
PSI
Lead
Filter
- A -
Filtering
00:00:00
Delta PSI
3.33
Lag
Filter
- B -
Idle
00:00:00
Delta PSI
2.05
Purge V5A
Purge V5B
2.6
PSI
-A-
213
GPM
-B-
0
GPM
0.6
PSI
V3A Backwash
V2A Effluent
V2B Effluent
V3B Backwash
44.93
Feet
44.93
Feet
RW P1
Lag
RW P2
Lead
Well No.1
30 Foot
Well No.2
30 Foot
RW Pump 1 is Lead
Reservoir
500,000 Gallons
58163
FG
86.6 %
432961 Gal.
Distribution System
FW P1 is Lead
Bw Pump
FW P1
FW P2
Bw
0
GPM
FW
211
GPM
Finished Water
CL2 0.89 PPM
FL 0.62 PPM
Wst P1
Wst P2
Waste Discharge
Waste Tank
28.9 %
Lead
Lag
214
GPM
C
FW CL2 @ 0.00 PPM
Fluoride @ 0.67 PPM
A B
Finished Water Clearwell
60.9 %
Lead
Lag
Filter Effluent
CL2 0.26 PPM
Aux. Power Generator

After



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Filter System

Filter Selection and Control

Filter Selection

Filter 1 & Filter 2 | Filter 1 Only | Filter 2 Only

	Filter 1	Filter 2
Current Level	4.84 in	4.24 in
Operating Level Setpoint	4 in	4 in

Filter Water Level Alarming

Setpoint	Filter 1	Filter 2
Hi-Hi Level Alarm Setpoint	22 in	22 in
High Level Alarm Setpoint	20 in	20 in
Low Level Alarm Setpoint	-20 in	-20 in
Lo-Lo Level Alarm Setpoint	-22 in	-22 in

Level Alarms Delay Setpoint	5 sec

Levels measured from the top of filter troughs

Filter Effluent Turbidity Alarming

Setpoint	Filter 1	Filter 2
Hi-Hi Turbidity Alarm Setpoint	0.6 NTU	0.6 NTU
High Turbidity Alarm Setpoint	0.35 NTU	0.35 NTU

Turbidity Alarms Delay Setpoint	300 sec
Turbidity Alarms Delay After Backwash SP	60 min

Present Status

Setpoint	Filter 1	Filter 2
Headloss	1.4 in	2.24 in
Filter Effluent Turbidity	0.091 ntu	0.279 ntu
Water Level	4.84 in	4.24 in
Effluent Valve Position	0 %	0 %
Effluent Valve		
Influent Valve		
Waste Valve		
Backwash Valve		
Air Valve		
Call For Backwash?	Off	Off

Filter 1 & Filter 2 Enabled

Waste Tank Level Alarming

Setpoint	Value
Waste Tank High Level Alarm Setpoint	80%
Waste Tank High Level Alarm Delay Setpoint	5 sec

Backwashing

Cycle Times

Setpoint	Value
Backwash 1 Cycle Time	60 sec
Air Scour Cycle Time	360 sec
Backwash 2 Cycle Time	180 sec

Auto-Initiate

Setpoint	Value	
Backwash Initiate by Headloss	30 in	
Backwash Initiate by Headloss Delay	420 sec	
Backwash Initiate by Turbidity	0.9 NTU	Disabled
Backwash Initiate by Turbidity Delay	300 sec	
Backwash Initiate by Time	48 hr	Disabled
Waste Tank Max Level for BW	5 %	
Clearwell Min Level for BW	70 %	

Time Left Before Next Auto BW is Permitted

Filter 1 0.0 min

Filter 2 29.9 min

Manual-Initiate

Force BW Filter 1 | Force BW Filter 2

Backwash Cancel (Reset)

Cancel BW Filter 1 | Cancel BW Filter 2

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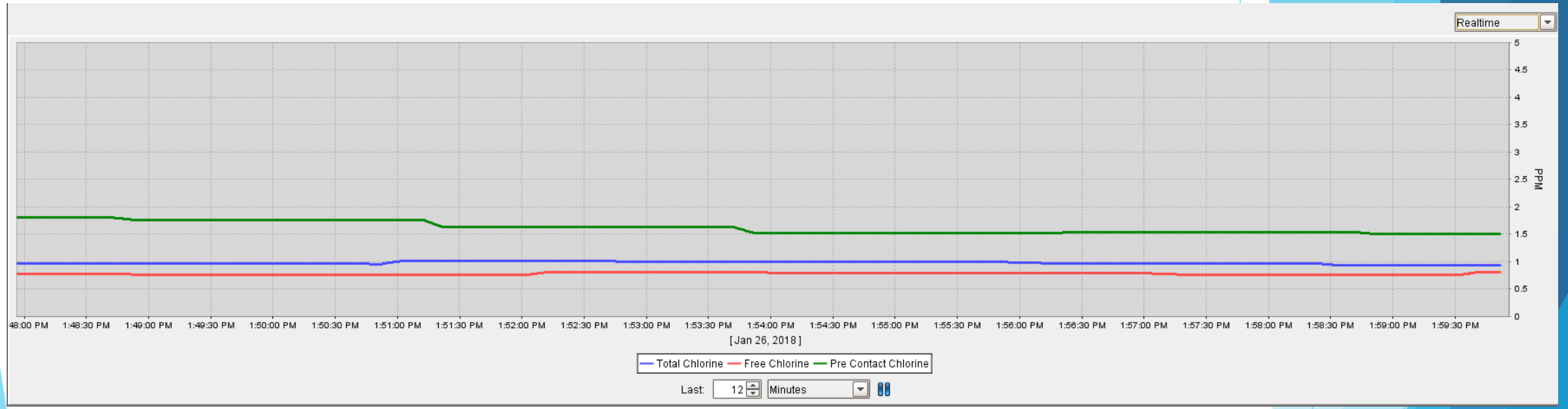
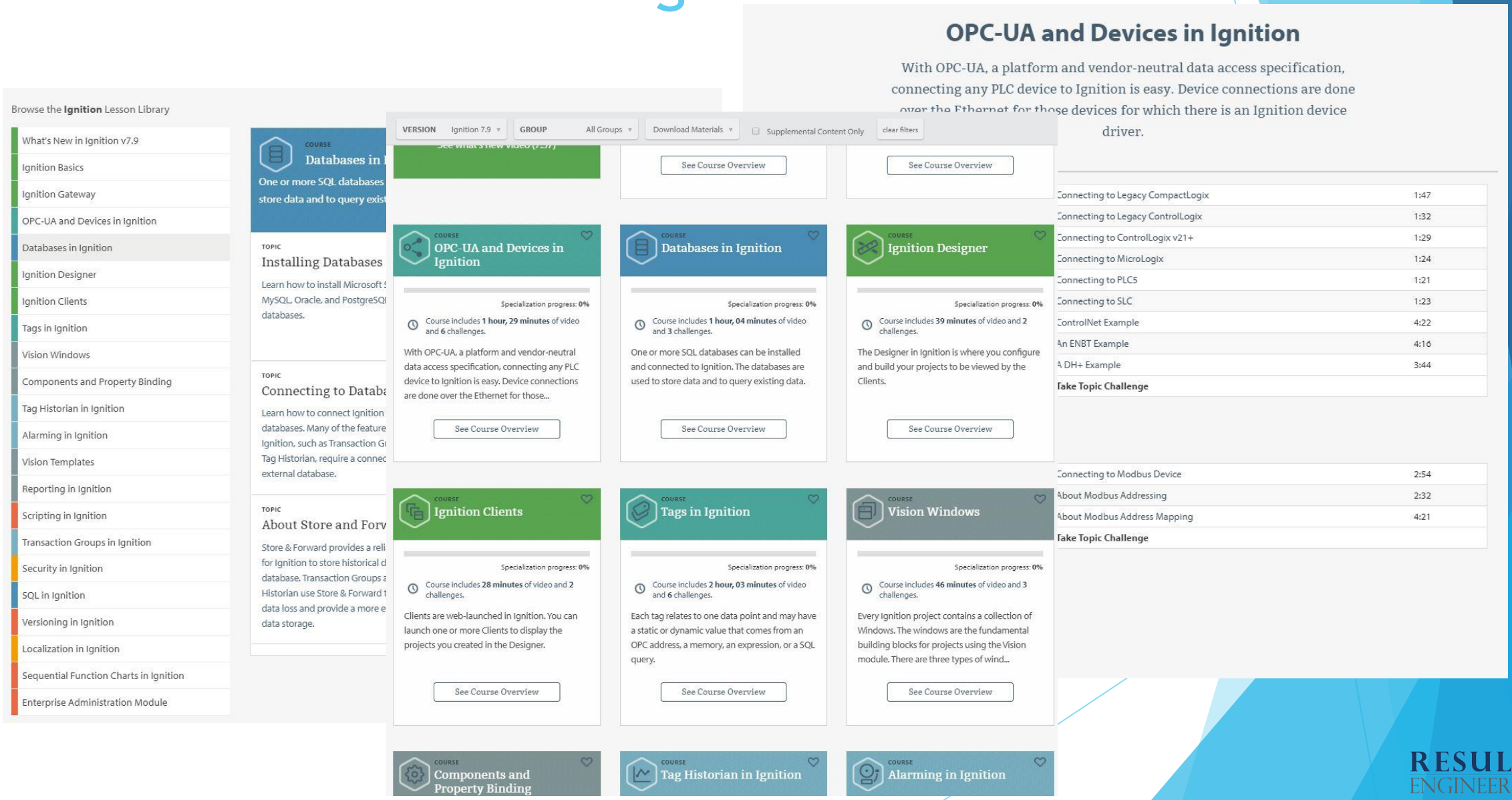
Trends


Realtime
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
PPM
48:00 PM
1:48:30 PM
1:49:00 PM
1:49:30 PM
1:50:00 PM
1:50:30 PM
1:51:00 PM
1:51:30 PM
1:52:00 PM
1:52:30 PM
1:53:00 PM
1:53:30 PM
1:54:00 PM
1:54:30 PM
1:55:00 PM
1:55:30 PM
1:56:00 PM
1:56:30 PM
1:57:00 PM
1:57:30 PM
1:58:00 PM
1:58:30 PM
1:59:00 PM
1:59:30 PM
[Jan 26, 2018]
Total Chlorine
Free Chlorine
Pre Contact Chlorine
Last:
12
Minutes

Online Courses/Training



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Why Ignition?

- Cheaper
  - Unlimited Licensing
  - Universal Platform
  - All at a one-time cost, no monthly cost for licensing
- Simpler
  - Web-Based Clients
  - Built on Trusted IT standards
- More efficient
  - Simple to work and build in, and very powerful
  - Simple to upgrade existing SCADA systems to Ignition

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Summary

- Ignition is a powerful, flexible, and affordable solution for plants, business, and industry
  - “One Stop Shopping” for your plant needs
- Results Engineering, Inc. is a certified Ignition integrator with many successful installations in Maine

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- mfurman@resultseng.com

- www.inductiveautomation.com

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