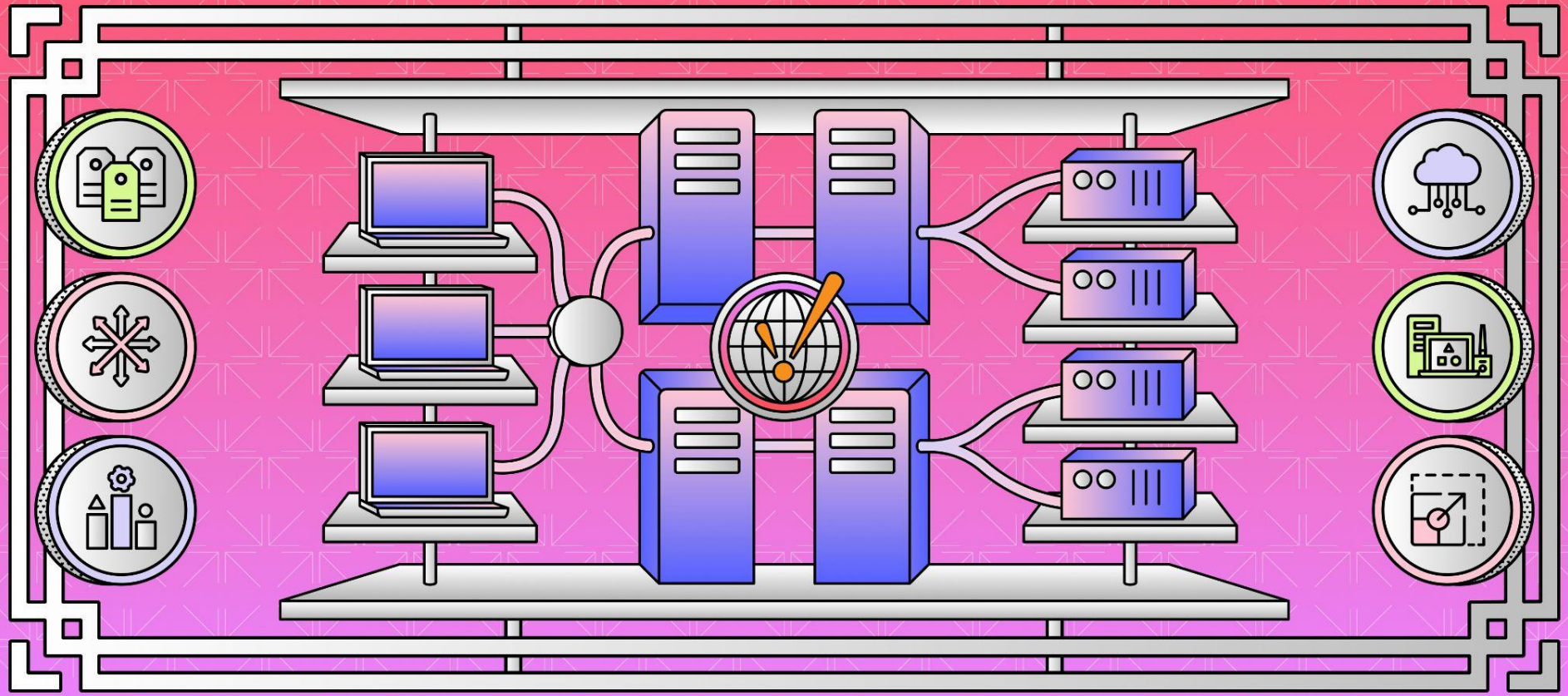
Stop Struggling, Start Scaling Your System With Ignition



Moderator

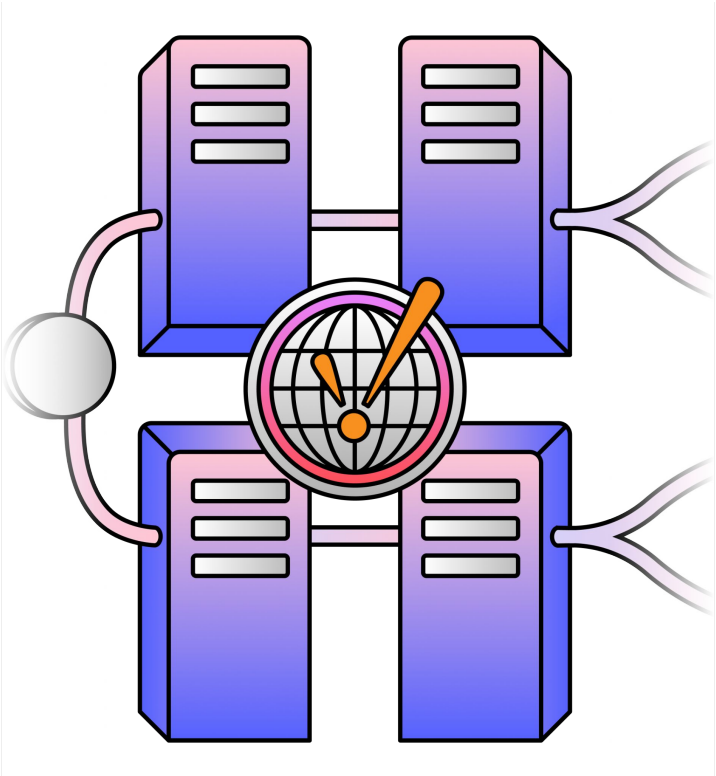
Reese Tyson

Senior Sales Engineer I

Inductive Automation

Agenda

- Introductions
- Project by Vertech
- Project by Enuda
- Project by DMC
- Project by Multi-Dimensional Integration
- Q&A



Guest Speakers

Alex Klein
Digital Plant Manager
Vertech

Addison Waege
Scrum Master
Vertech

Dragana Nikolova Cvetanoska
Head of Project Management
Enuda

John Williams
Regional Manager
DMC

Ross Mowry
System Integration Engineer
Multi-Dimensional Integration

About Inductive Automation

Introducing Ignition

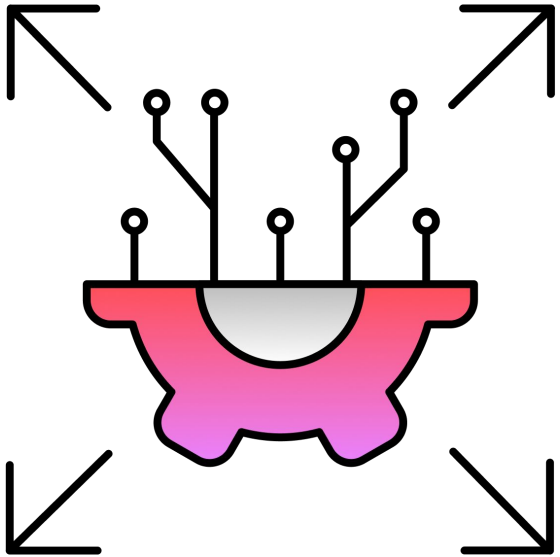
Connect, Design, and Deploy Without Limits:

- One central hub for the plant floor and beyond
- Build any kind of industrial application
- Web-deploy to desktops, industrial displays & mobile devices
- Unlimited licensing
- Cross-platform compatibility
- Industrial-strength security & stability

The Unlimited Platform for Enterprise Integration, Industrial Applications, and More

Unlock Real Scalability With Ignition

- Ignition solves scalability pain points with unlimited licensing and flexible architectures.
- Let’s explore some real-world projects to see how Ignition’s unique features made scalability easy.



Scalability in Datacenters

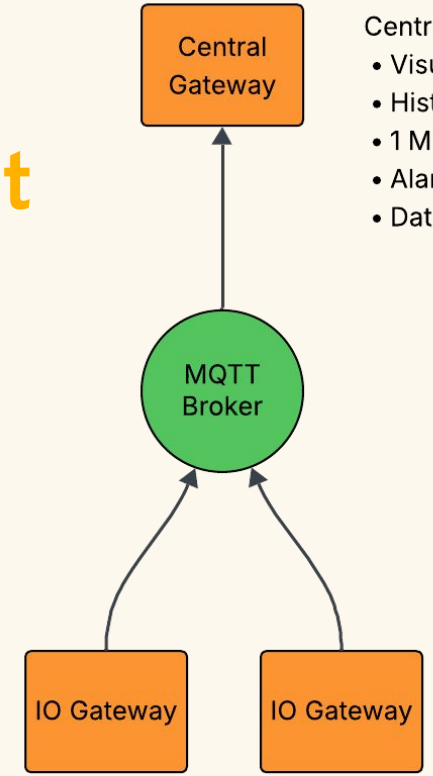
For Inductive Automation

Vertech

Lots of connections and Data

- Hundreds of devices to connect to
- Millions of tags to account for
- Multiple simultaneous users per site
- Our original intent needed to undergo a revolution…..

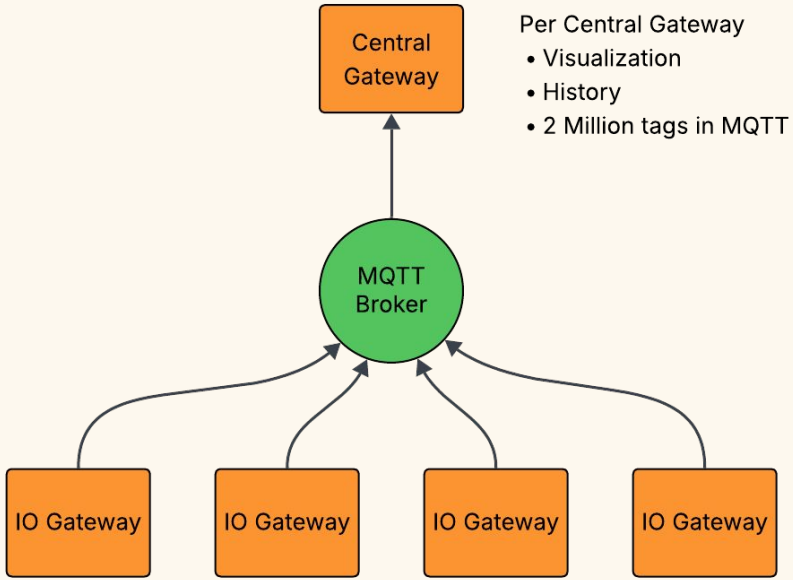
Starting Point



Central Gateway
- Visualization
- History
- 1 Million tags in MQTT Engine
- Alarms
- Data Aggregation

Per Gateway
- 200-300 PLC connections
- 400k-500k tags

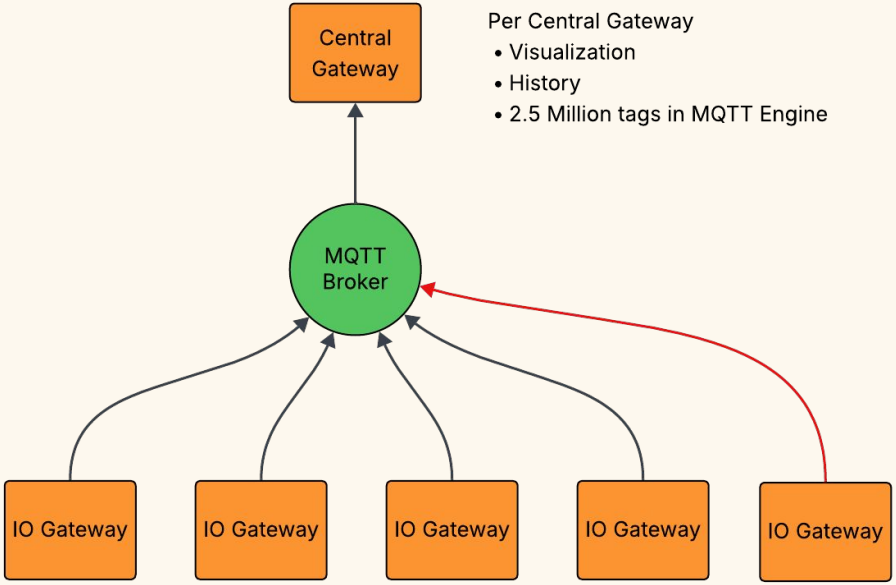
Max Stable Size



Per Central Gateway
- Visualization
- History
- 2 Million tags in MQTT Engine

Per IO Gateway
- 200-300 PLC connections
- 400k-500k tags

It Broke…..



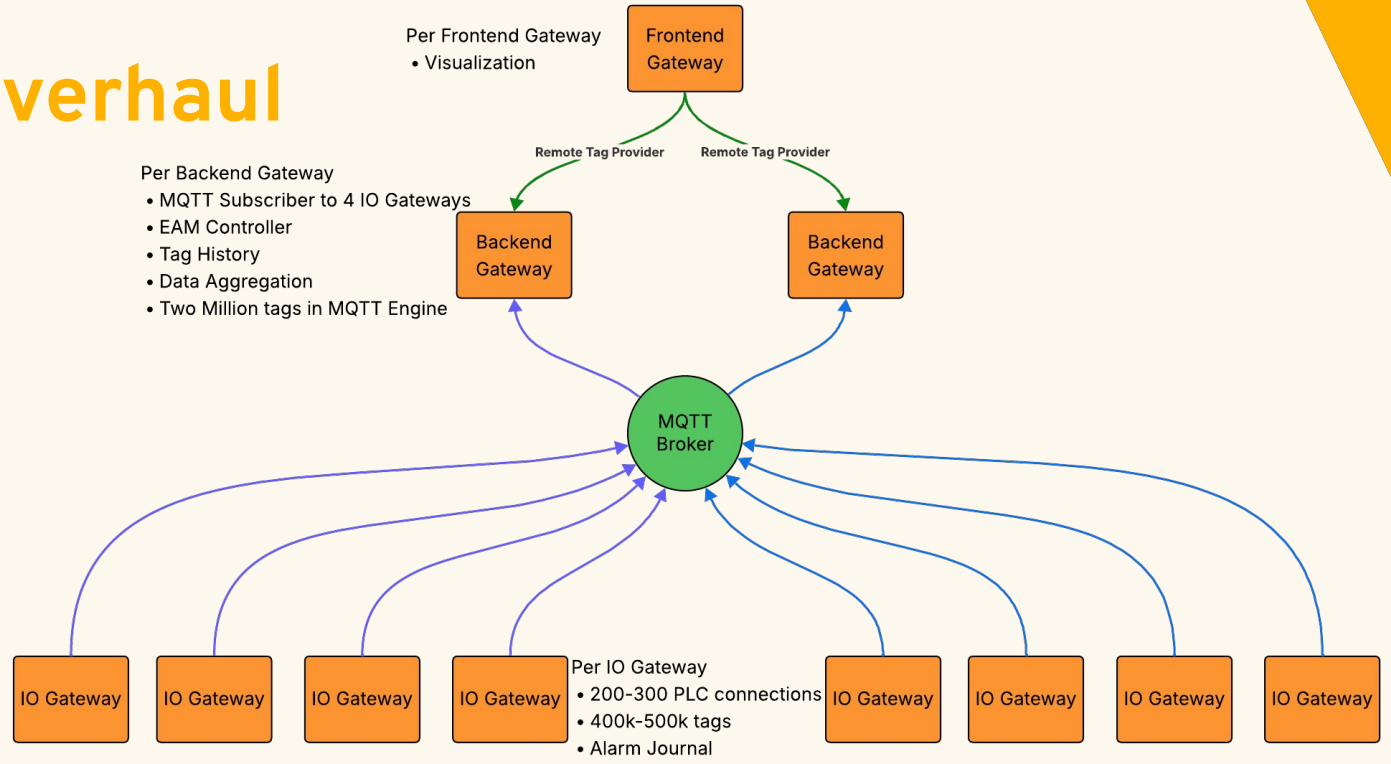
Per Central Gateway
- Visualization
- History
- 2.5 Million tags in MQTT Engine

Per Gateway
- 200-300 PLC connections
- 400k-500k tags

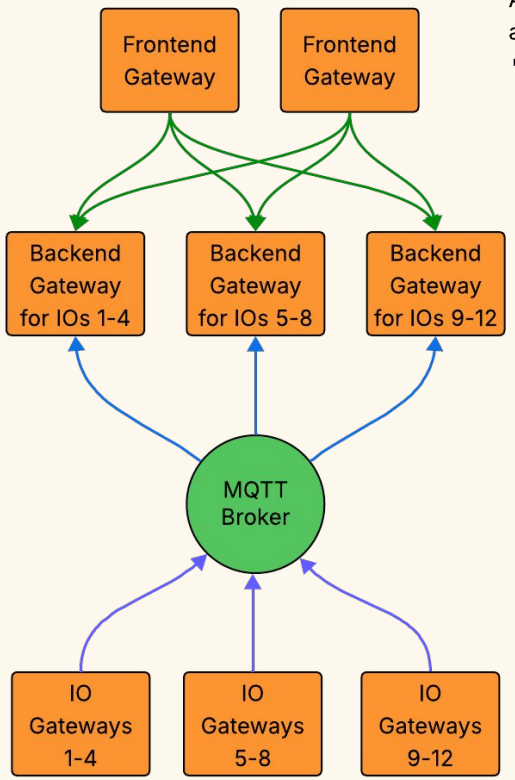
Reached out to our friends at IA

We brought this problem to IA and through many brainstorming sessions and baseline testing we landed on a prescribed scale out architecture.

The Overhaul



Horizontal Scale



Add New frontend gateway
as needed based on concurrent user load

Add New Backend gateway
every fourth IO gateway

Add New IO gateway
each time we cross 500k tags

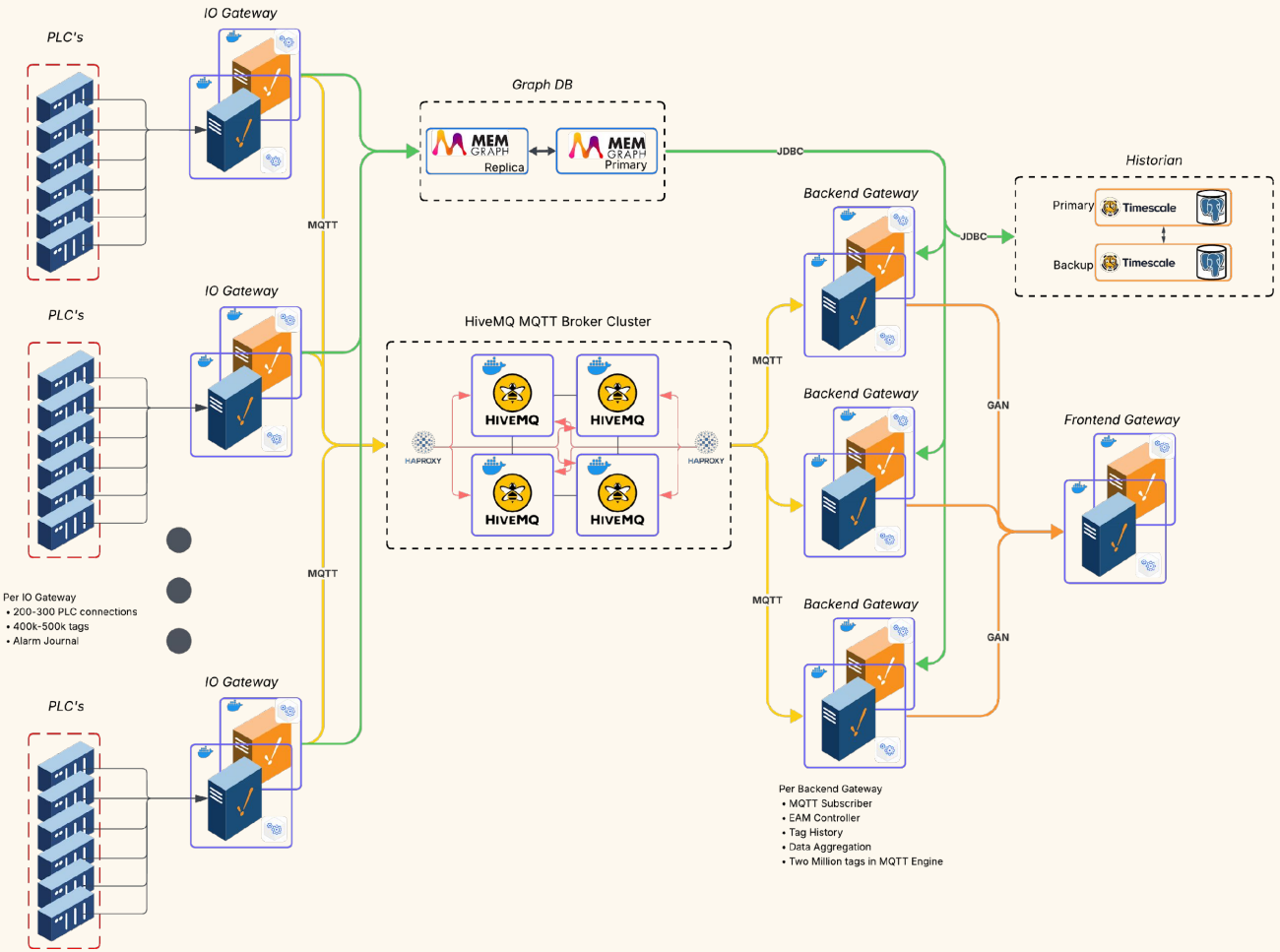
Ignition as a Platform Allowed us to Scale

- Minimal rework of the application
- Clear scaling plan
- Deepened our understanding of the platform
- Happy customer

But scaling is not just about how big you can grow, you must be able to maintain it…..

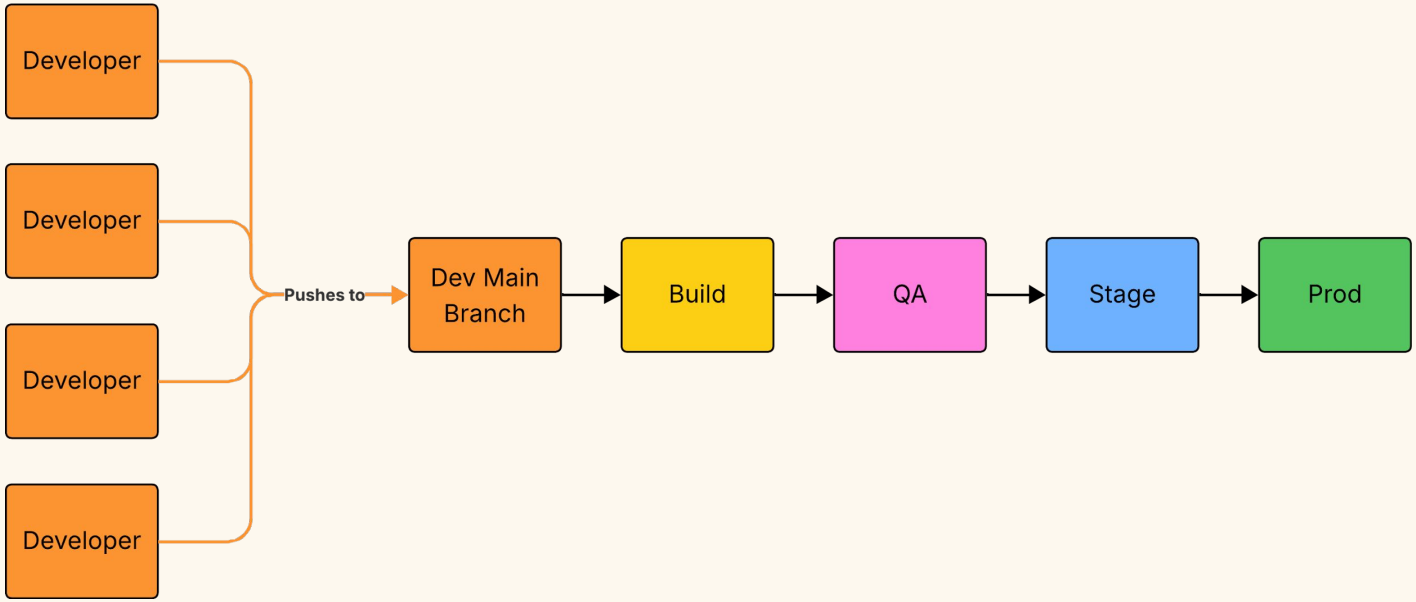
Ignition 8.3

- Containerization and CI/CD became much easier
- Architecture as code

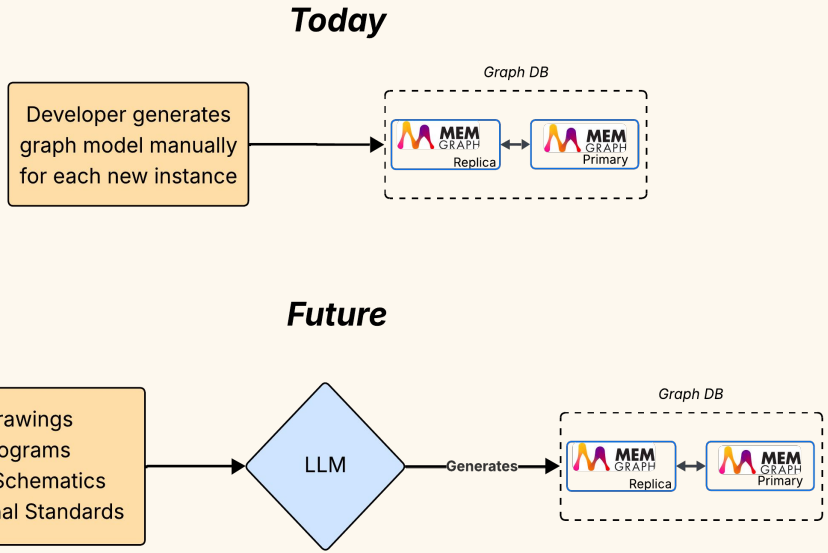


Throw Everything in a Container

Source Control & GitOps

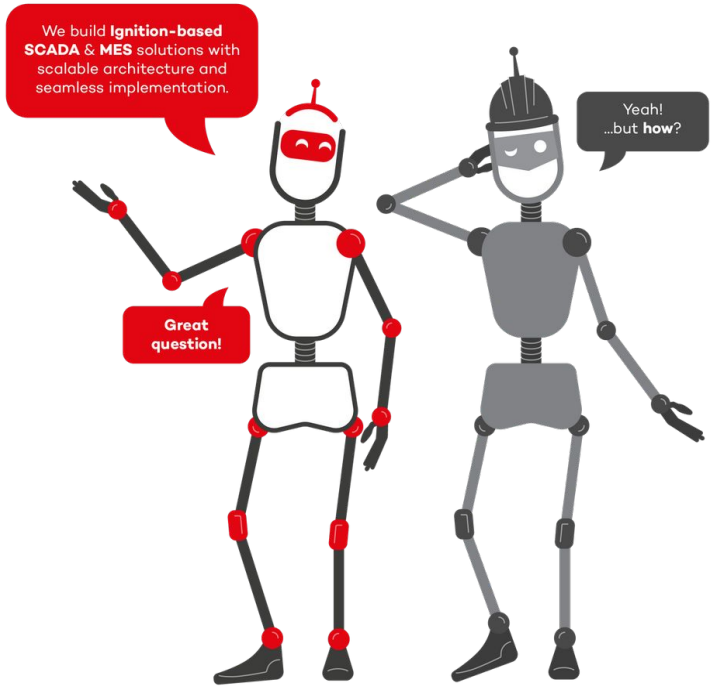


What Does the Future Look Like?



FROM UNUSABLE TO SCALABLE:

Redesigning Industrial Historical Reporting with Ignition



THE CHALLENGE

When Historical Reporting Breaks Down

Industry: Electrical Measurement

CRITICAL PERFORMANCE DEGRADATION

Queries for one hour of single-tag data were taking nearly 24 hours to complete.

ROOT CAUSES IDENTIFIED

- No defined polling strategy or tag organisation
- Legacy SCADA platform with limited data access
- Architecture unable to scale with system growth
- Inefficient database queries overwhelming the system

This wasn't a simple query optimisation problem—

the entire architectural foundation required a complete rethink

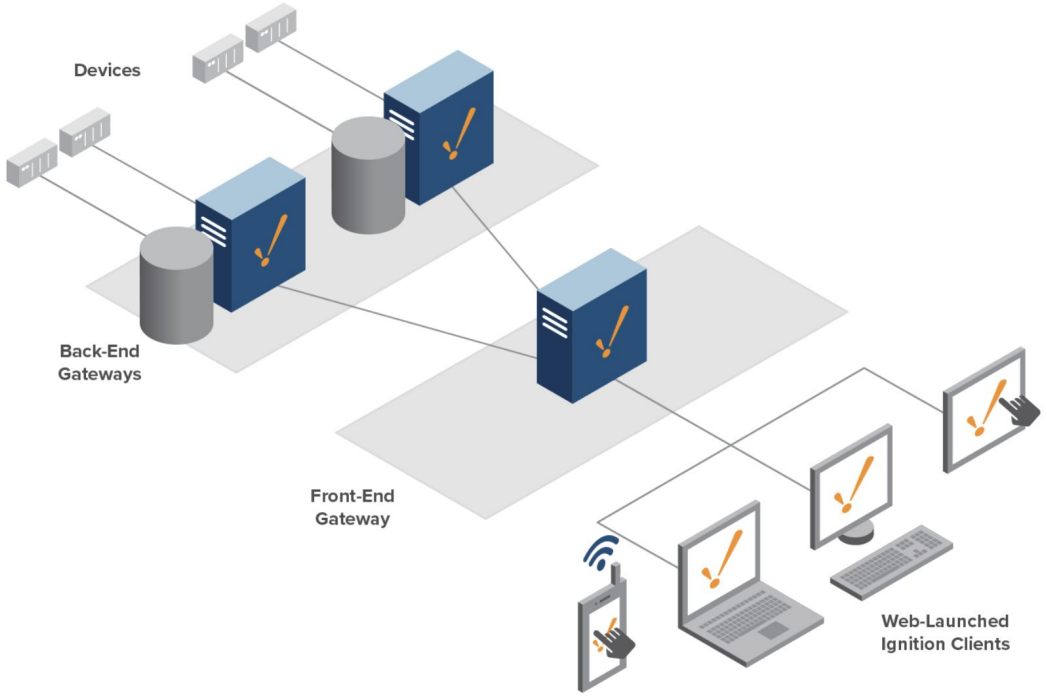
to support modern industrial operations.

THE SOLUTION

Redesigning The Architecture with Ignition

We implemented **a scalable solution using Ignition**, separating backend data collection from frontend visualisation.

This layered approach enabled **independent scaling** of each component while **maintaining system performance and reliability across the entire site.**



THE SOLUTION

Backend Layer: Data Acquisition

01

Data Acquisition

Direct connection to PLCs and field devices with optimised polling rates.

02

Tag Structuring

Organised hierarchical naming conventions for efficient querying.

03

Local Buffering

Store-and-forward capability ensures zero data loss during network disruptions.

04

Time-Series Storage

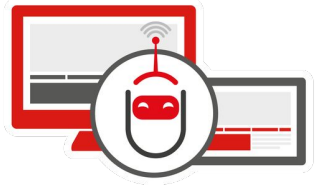
PostgreSQL with TimescaleDB extension for optimised historical data management. Optimised data storage performance at the gateway level.

THE SOLUTION

Frontend Layer & Scalability Benefits

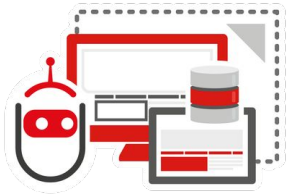
Site-Level Supervision

Centralised Ignition Standard Gateway provides unified visualisation, dashboards, and KPI reporting across all shop floor areas without impacting data collection performance.



Gateway Network Architecture

All communication between Level 1 and Level 2 flows through Gateway Network, enabling secure, efficient data transfer and centralised system management.



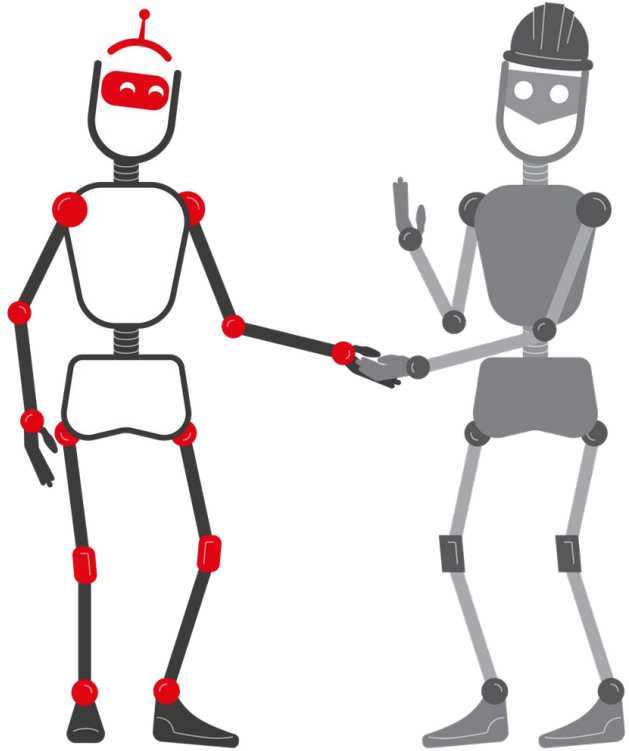
Horizontal Scalability

Add new Standard Gateways for additional shop floor areas without redesigning the architecture. Each gateway operates independently while contributing to the unified system.

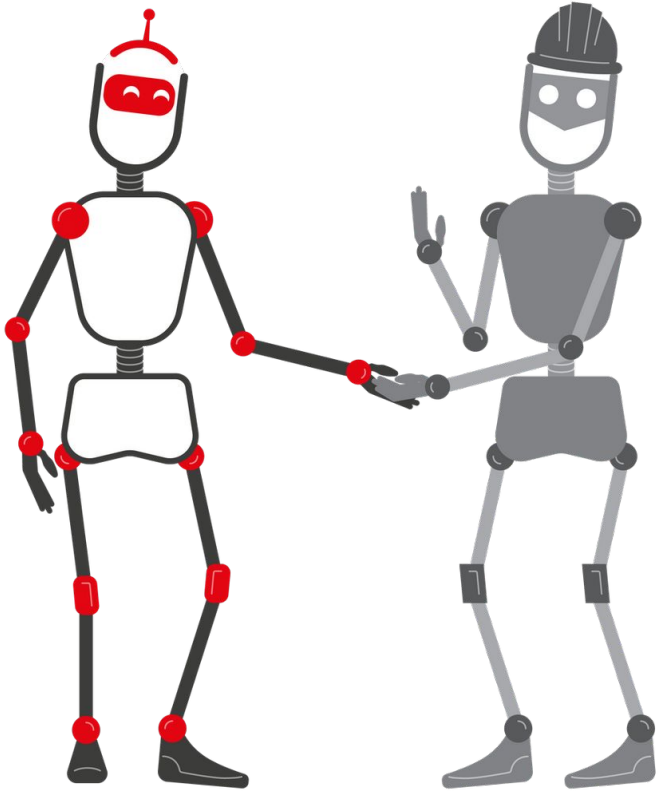
The Result

Historical queries now return in seconds, not days.

The system **scales seamlessly** as operations expand, and engineers have **reliable access to the data they need for informed decision-making.**

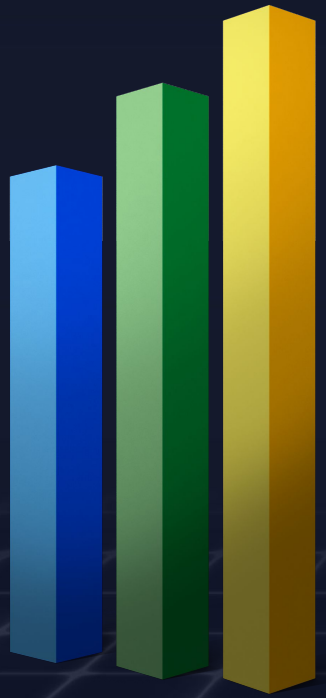


Thank You!



About DMC

- **Ignition & Sepasoft Premier Integrator**
- 100+ Ignition Developers
- Awards
  - 2021 Firebrand Award Winner
  - 2024 Ignition Build-a-Thon Winner
  - 2024 CSIA (Control System Integrators Association) Integrator Member of the Year



How do we scale from a pilot facility to a production facility?

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Ignition

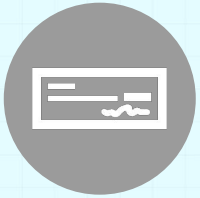
Sila Problem Statement

Alameda, CA – Sila Headquarters
- Research lab, battery cell lab, and manufacturing facility
- 50 MWh capacity
- **8 PLCs and 50K tags, single redundant gateway.**

Moses Lake, WA – Production Facility
- 5 GWh capacity (25 - 100 GWh expansion)
- **25+ PLCs and 260K tags, 10+ edge instances.**

DMC Sila

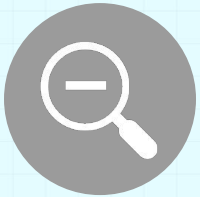
Common Scaling Problems



Lack of Investment

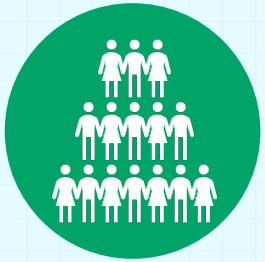
Lack of Int. Resources

Larger Scope + More Voices



No Visibility to Vendors

Geographic Differences



Dedicated Internal Teams

Up-front Expectation Setting

Supplemental External Resources

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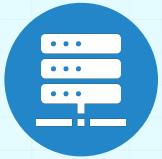
Key Technical Problems



Control Standardization

Flexibility & Uptime

Key Data Access

Consistent User Experience

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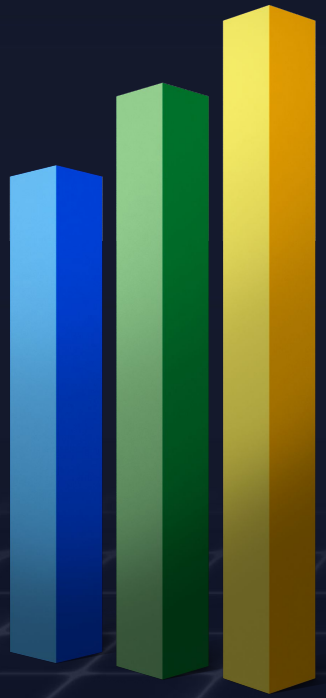

Control Standardization

How do we standardize control schemes between different tools, systems, and developers?

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Control Standardization

Previous State

- Variety of OEMs with different code bases
- Bespoke UDTs and devices based on developer/team

Solution

- Smart UDTs
- Re-develop OEM code as needed
- Import/export spreadsheet

Current State

- Standard UDTs across all equipment
- Faster tag addition and modification with import/export tool

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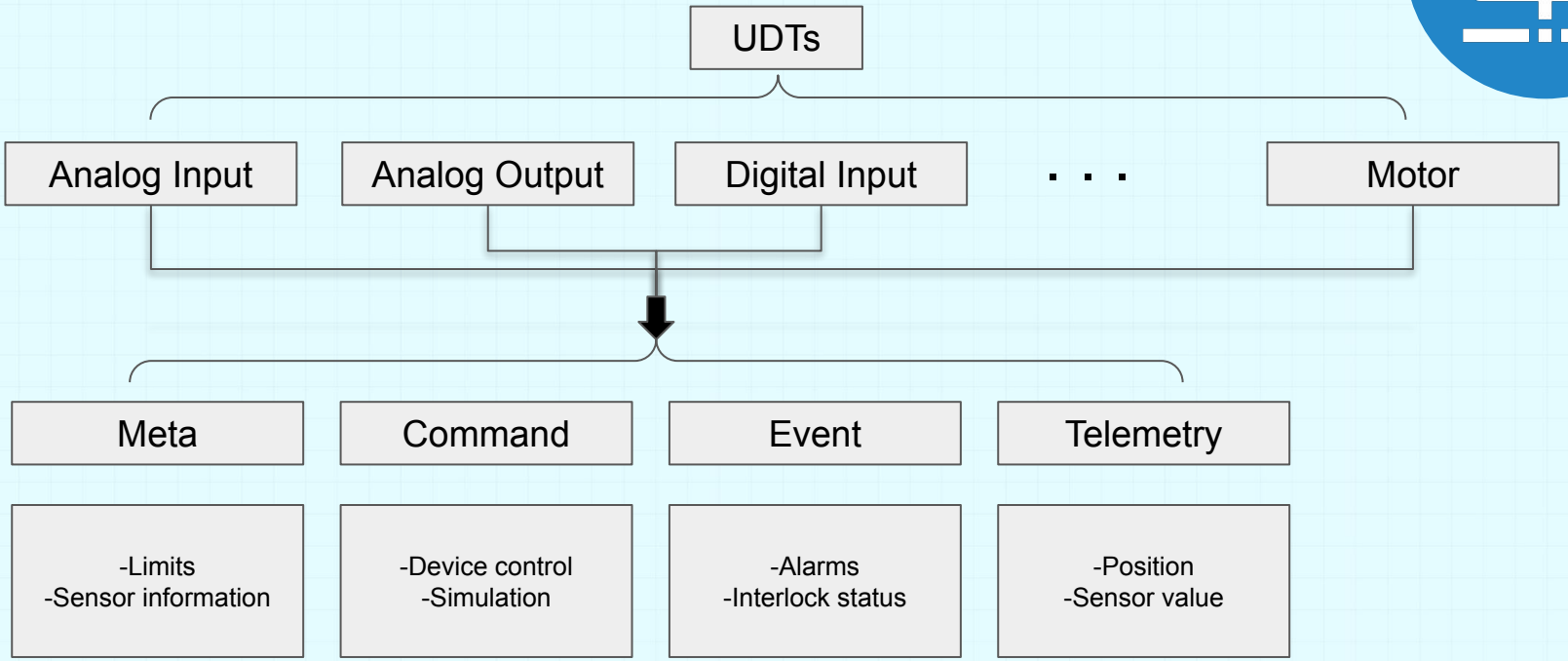
Control Standardization



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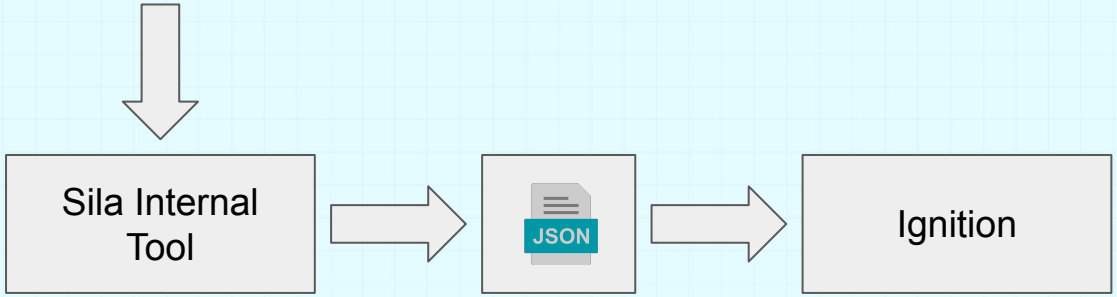
Control Standardization

	A	B	C	F	G	H	I	J	K	L
1	**PnID**	**OPC UDT Struc**	**RootTag**	**description**	**engLo**	**engHi**	**alarmHiLimit**	**alarmLoLimit**	**rawValue**	**processValue**
2	TI_006	Sila UDT	"DB_H_001_Inputs"							
3	TI_007	Sila UDT	"DB_H_001_Inputs"							
4	TI_008	Undefined	"DB_H_001_Inputs"	$temp sensor 1	.LLM	.HLM	.SP_H	.SP_L	.ACT_Raw	.ACT
5	TI_009	Undefined	"DB_H_001_Inputs"	$temp sensor 2	.SpInputMin	.SpInputMax	AlarmH	AlarmL	.InputValue	.OutputValue



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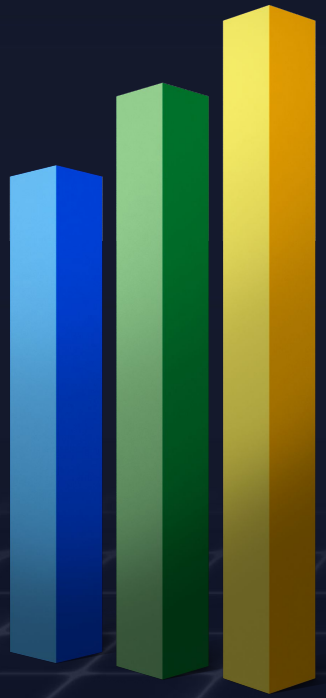

Flexibility & Uptime

How do we bring tools online quickly and provide flexibility for future downtime?

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Ignition

Flexibility & Uptime

Previous State

- Gateway network for data collection and OPC connections
- Point-to-point connections, heavier load on edge devices
- Manual setup for new tools

Solution

- MQTT pub/sub model
- Decoupled, lighter data flow
- Automatic tag discovery speeds up onboarding

Current State

- Decoupled architecture
- Edge devices simplified
- Foundation for UNS
- Robust and flexible

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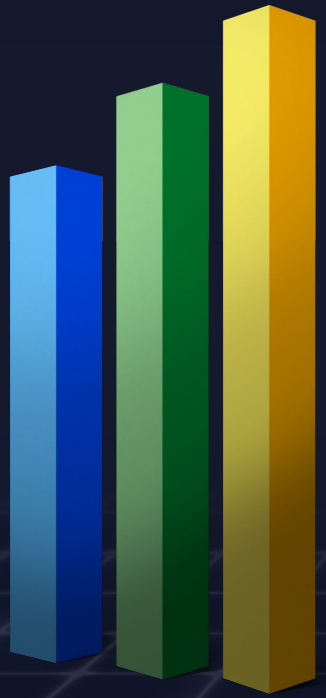

Key Data Access

How do we generate and provide key system data to key personnel?

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Ignition

Key Data Access

Previous State

- Tools logged data separately
- Connections were one-off and brittle
- Users had to request data

Solution

- UNS
- Structuring tags by location/ unit/device instead of by PLC for user familiarity

Current State

- One namespace, many consumers
- Democratized access
- Consistent context
- Real-time availability

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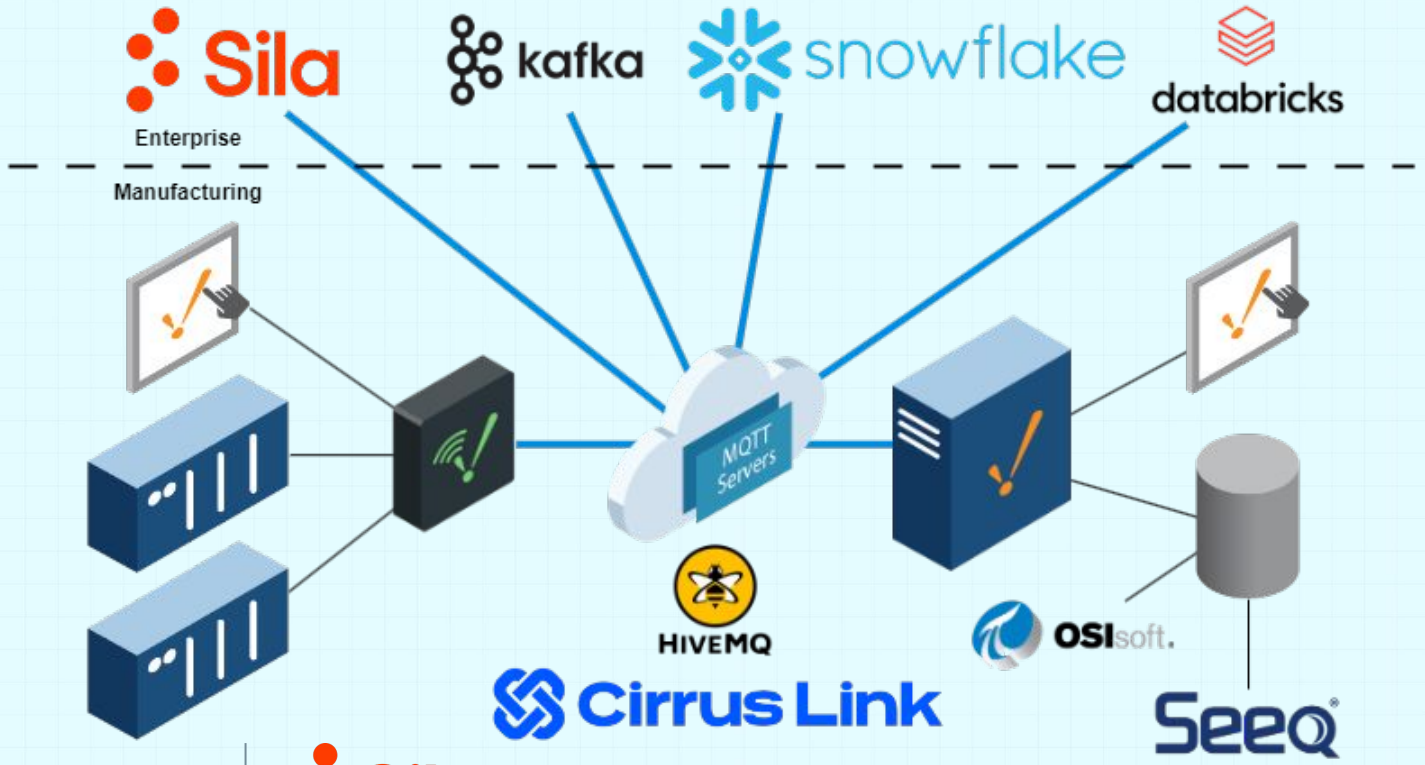
Key Data Access



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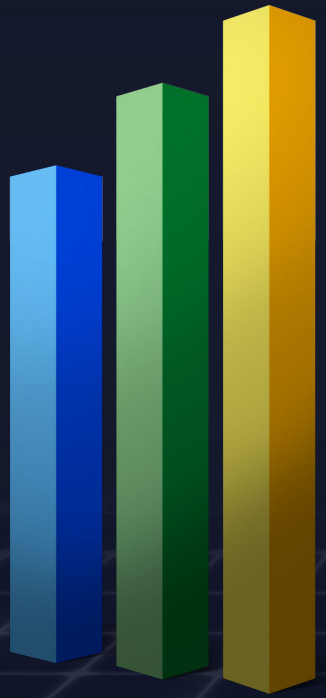

Consistent User Experience

How do we ensure a single look and feel from the edge through to the central control room?

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Ignition

Consistent User Experience

Previous State

- Disparate OEM HMIs
- Inconsistent standards between teams / developers

Solution

- Ignition Edge + Central Gateway Interfaces
- Deployment pipelines via Gateway Network
- Session properties

Current State

- Library of shared screens and components
- Common user interface for OEM and Sila developed tools
- Easy to use screens

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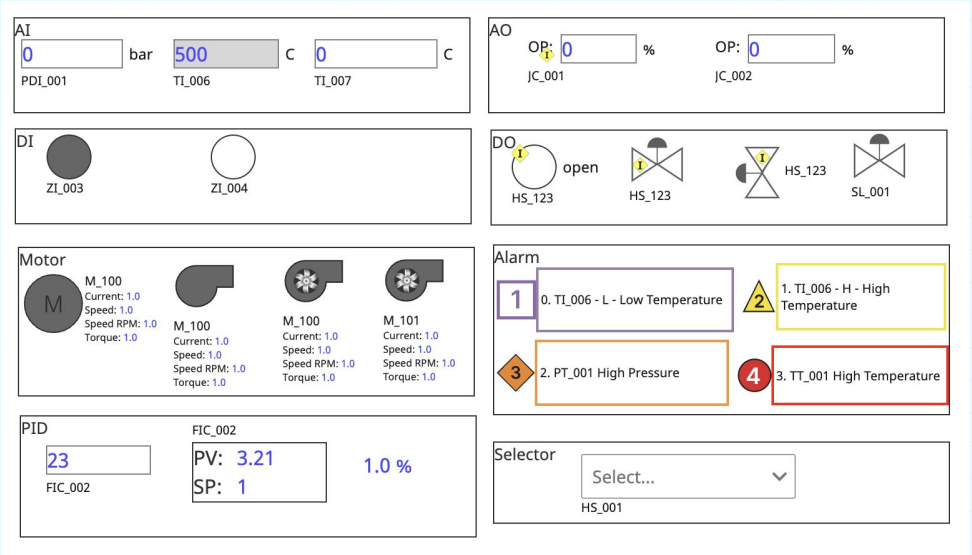
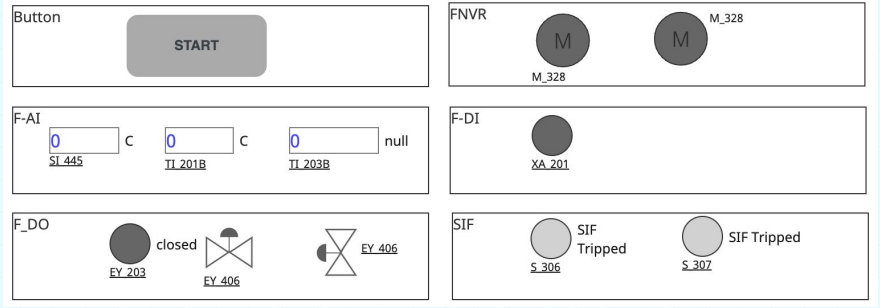
Consistent User Experience





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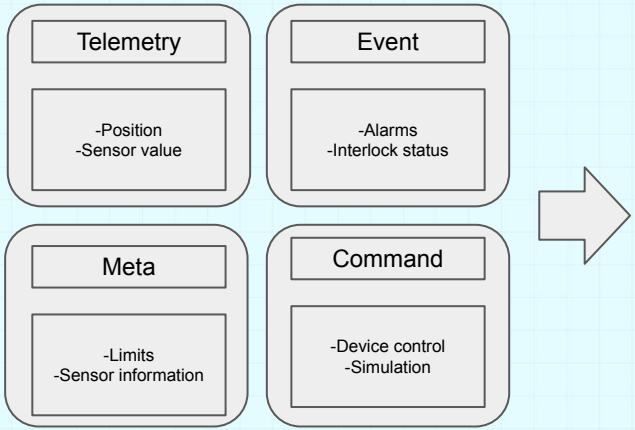
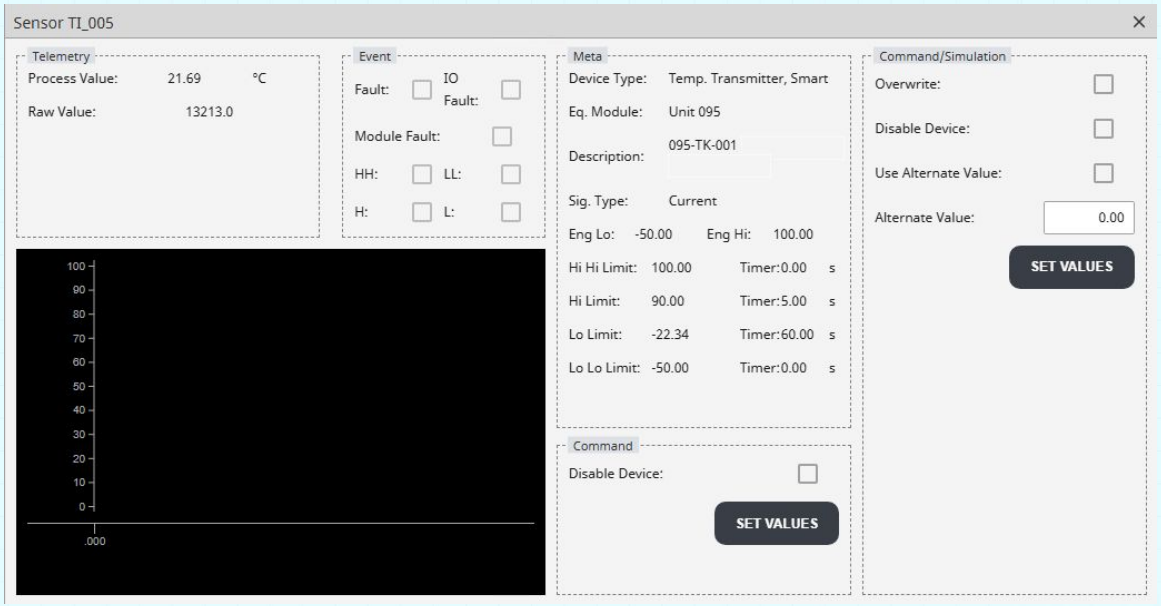
Consistent User Experience





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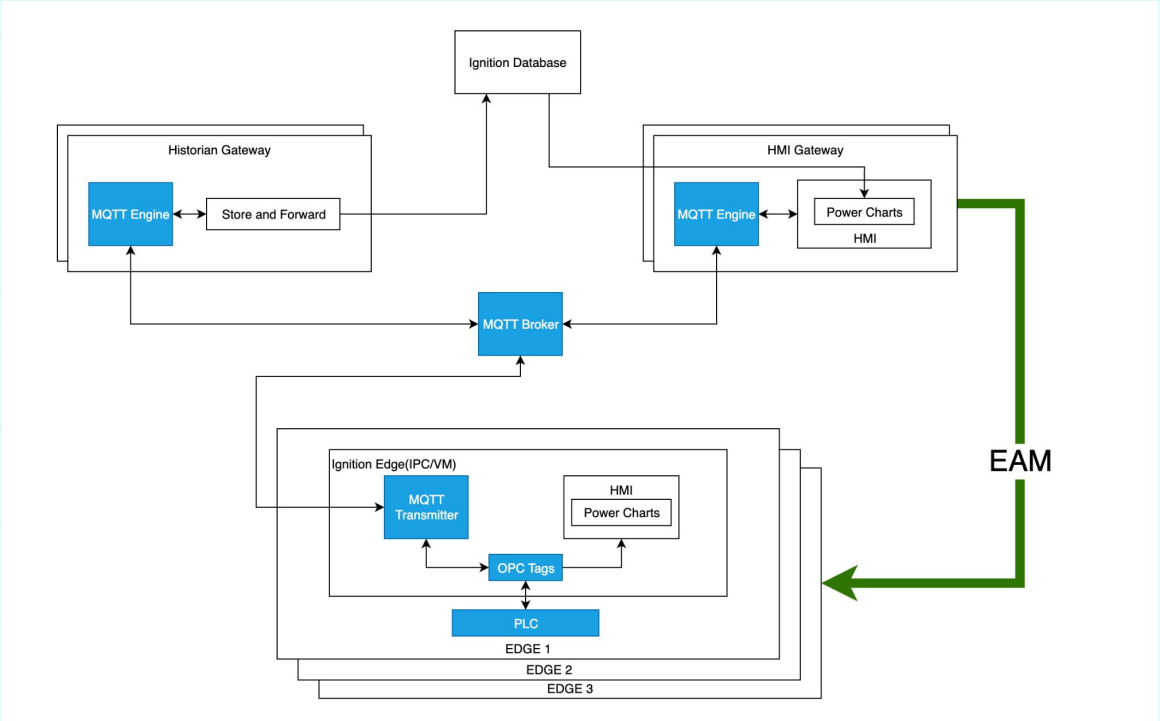
Consistent User Experience



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MULTI-DIMENSIONAL INTEGRATION

Ignition! by inductive automation

MES Workflow Integration At An Enterprise Scale

MULTI-DIMENSIONAL INTEGRATION

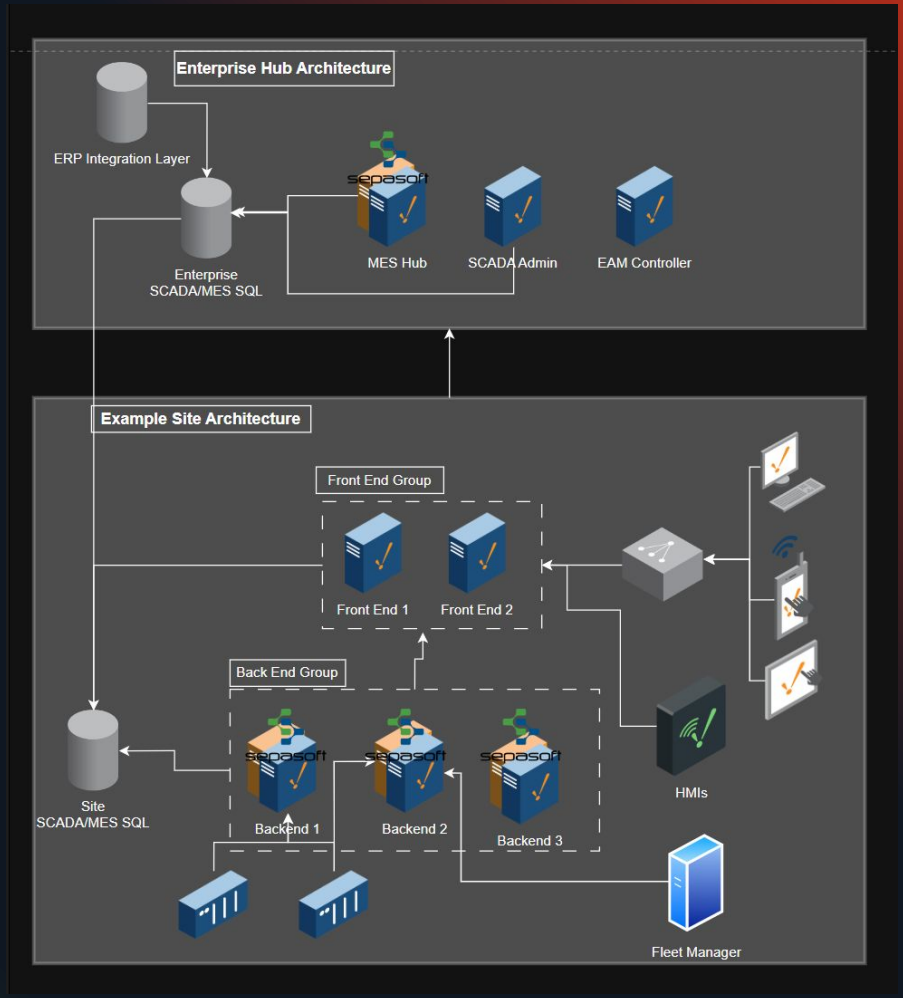
Project Summary

- **Scope**
  - Create an operator workflow engine that provided a standardized operator experience to orchestrate machine and component work orders across fabrication, paint, and assembly areas.
  - Integration of AMR/AGV fleet controllers, PLC controlled subsystems, torque tools, and other automated equipment.
- **Considerations**
  - Variable workflow requirements applied at the area, line, and cell level.
  - Modular design for ease of integration of future features.
- **Key Concepts**
  - Identify common use cases.
  - Identify where each required feature’s configuration belonged.

MULTI-DIMENSIONAL INTEGRATION

Architecture

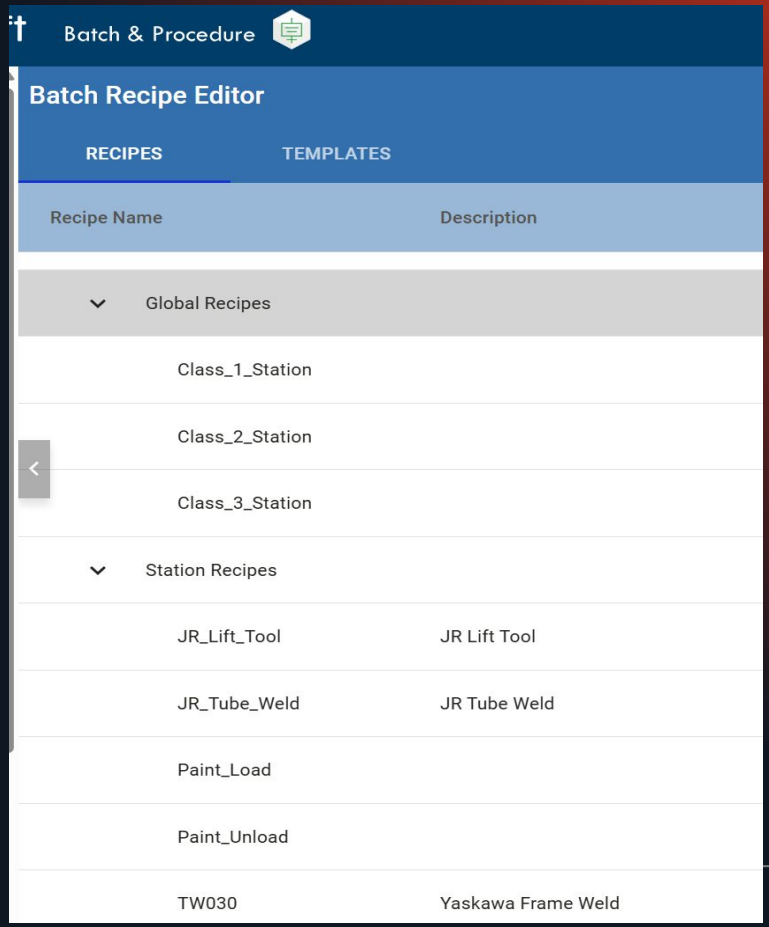
- Sepasoft MES Enterprise used to sync data and application resources.
- Back End Gateway Group
  - Load balancing of station cycle execution by area.
  - Strategic division of high load bearing features. Plant run schedule generation, AMR fleet manager integration…etc).
- Front End Gateway Group
  - Pairing with a load balancer to fit number of front end servers to match site size.



MULTI-DIMENSIONAL INTEGRATION

Station Class Definition

- Station class grouping to manage definition of the work content in a station and standardize the core process of work order execution.
- Class 1 – Operator work order interaction, no automated tooling.
- Class 2 – Cycle execution with an AGV/AMR.
- Class 3 – Cycle execution with recipe controlled automated tool.
  - Special consideration for equipment and station specific workflows.
- Resources managed globally at the MES Hub for synchronous consistent deployments to all sites and servers.



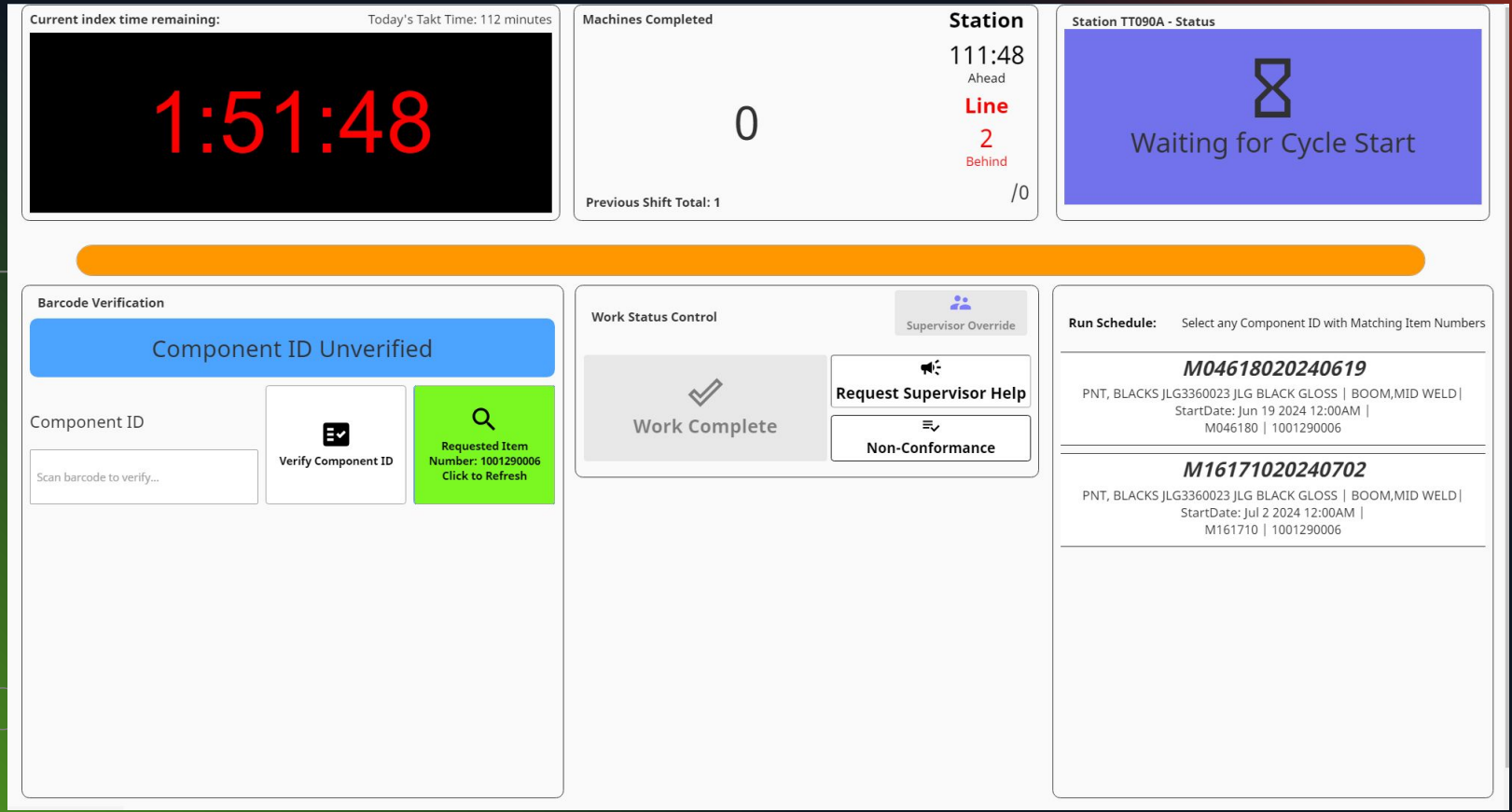
MULTI-DIMENSIONAL INTEGRATION

Resources Built For Scale

- Development of self configuring resources to manage large scale deployments and increase standardization were developed.
- Project standard script libraries to decrease developer spin up time and increase global variable references.
- Station Control View Mapping
  - Definition of all operator interfaces managed in site central SQL DB.
  - Tags within the station definition UDT pull the view layout data for use on a view canvas.
  - Provides the ability to update a station control screen site wide.
- Flexibility Where it Matters
  - UDTs and script libraries that leveraged the ISA-95 model.
  - Flexibility in the SCADA layer allowed workflows to be optimized at the station level.
  - Allowed for maintaining commonality in the MES layer as new use cases and stations are added to each facility.

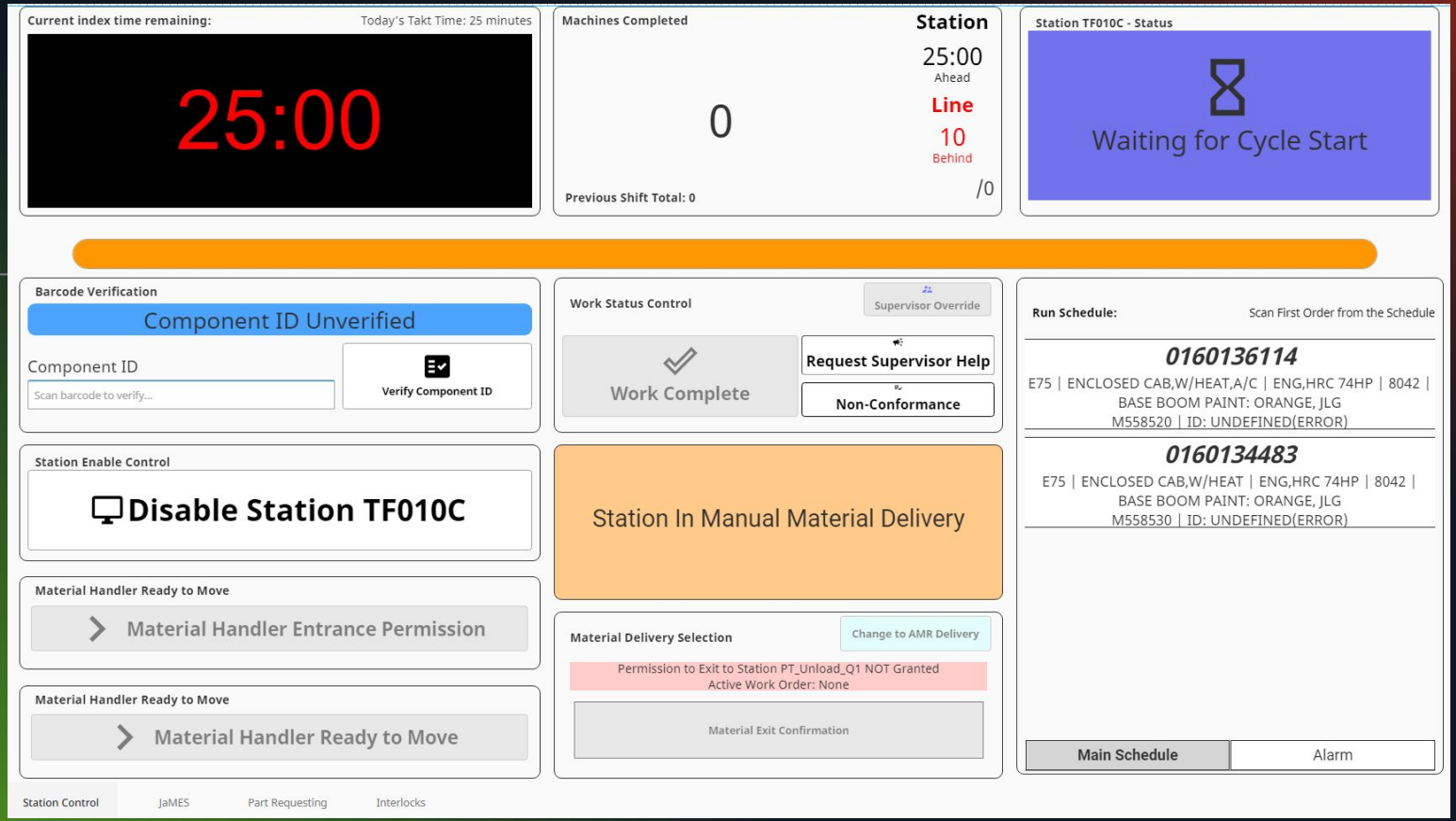
MULTI-DIMENSIONAL INTEGRATION

Class 1 Fabrication Station



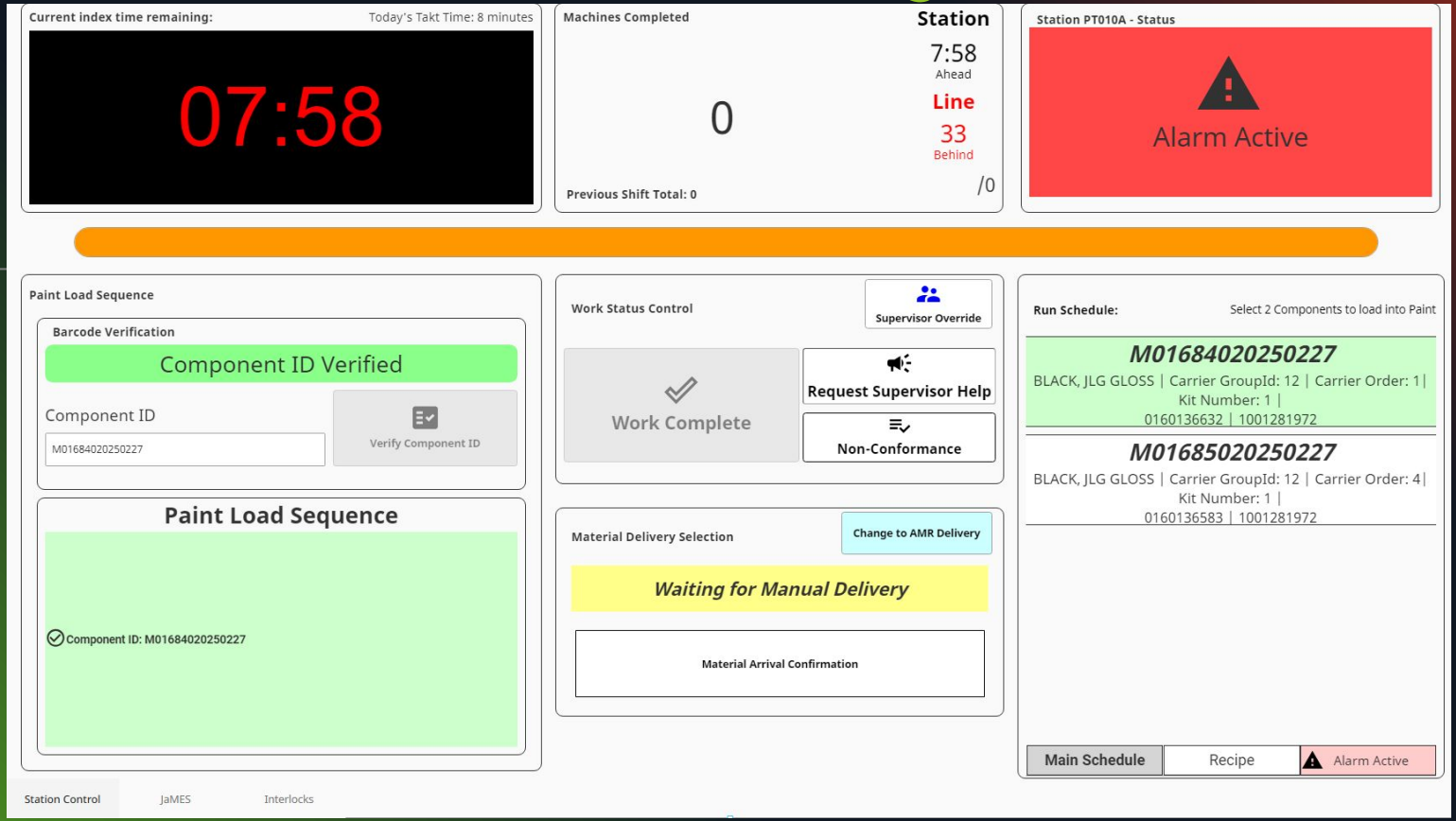
MULTI-DIMENSIONAL INTEGRATION

Class 2 Assembly Station Control Variant



MULTI-DIMENSIONAL INTEGRATION

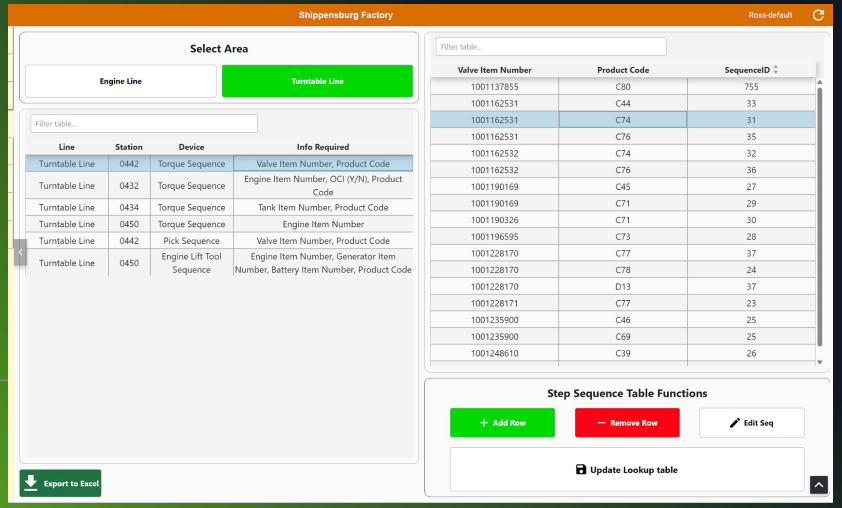
Class 3 Paint Line Loading Station

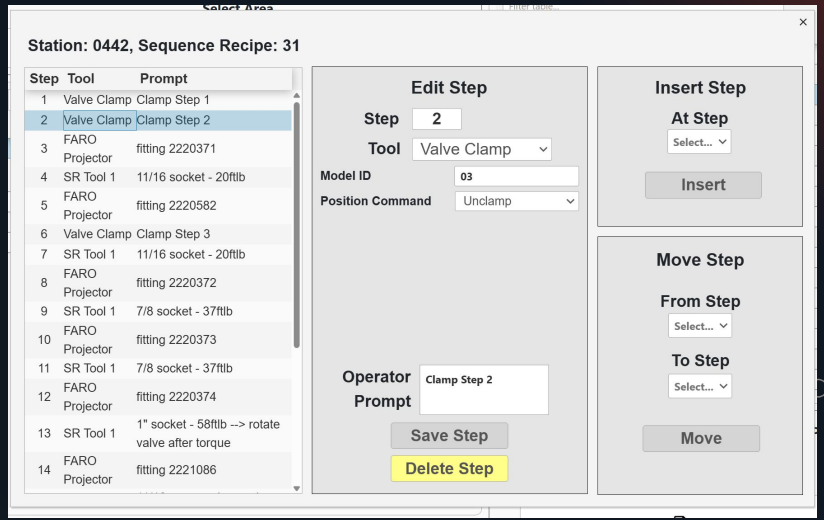


MULTI-DIMENSIONAL INTEGRATION

Automation Sequence Management

- Feature integrated into class 3 stations that allows for the sequence of automated tooling steps to be completed in a station for a given work order.
- Allows for a dynamic number of tools to be defined as part of a station. Users can edit what the mix of tooling steps and the recipe/job commanded to the system.
- Each tool definition is maintained in a UDT and relational database table as a new tool type is integrated.
- Enables a variable number of arguments in determining the recipe by automation sequence and station. Integrated into work order scheduling functionality to ensure standard order retrieval and catch issues caused by being unable to load a recipe in a station that needs it ahead of time.

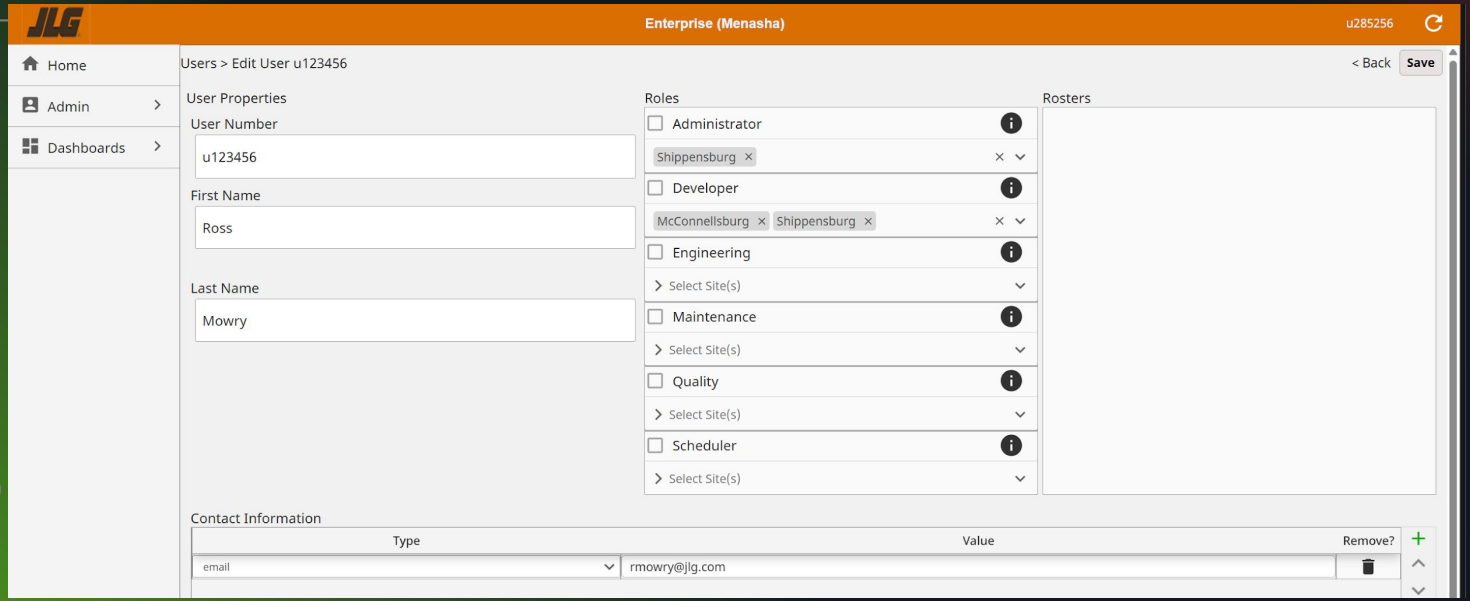




MULTI-DIMENSIONAL INTEGRATION

Global User Management

- **Integration of User Management at the enterprise level.**
  - Integration of AD/Hybrid user source to all Ignition devices in an effort towards SSO.
  - Allows for a user to be added to all site and Ignition Edge gateways at once.
  - Site specific role and roster management. Admin page to associate gateway network connections with a site as new gateways come online.



MULTI-DIMENSIONAL INTEGRATION

Future Integrations

- **Enterprise and Site Level UNS Integration**
  - Connectivity to monitor production and KPIs at all levels of the enterprise.
  - Historical data collection.
  - Enhanced velocity to future deployments.

- **Integration of Legacy Integrations**
  - Tying together smaller one-off projects into the enterprise architecture for better visibility and application synergy.

Ready To Try Ignition For Yourself?

Download the full version for free at:

inductiveautomation.com

inductiveuniversity.com

Ignition User Manual also available at:
docs.inductiveautomation.com

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Questions & Answers

Ignition by inductive automation

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