Launching An Easier, On-Premises Approach to Digital Transformation & Using Next-Gen Tools To Create Super Data

Today's Speaker

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Co-Director of Sales Engineering

Inductive Automation

Agenda

- About Inductive Automation
- Digital Transformation Benefits
- Digital Transformation Problems
- DataOps
- Edge Computing
- Leveraging the Cloud
- Q&A

About Inductive Automation

inductive automation

- Founded in 2003
- Founded by experienced system integrator
- HMI, SCADA, MES, and IIoT software
- Highly diversified customer base across many industries
- Over 2,200 integrators
- Used by 48% of Fortune 100 companies

Learn more at: *inductiveautomation.com/about*

About Inductive Automation

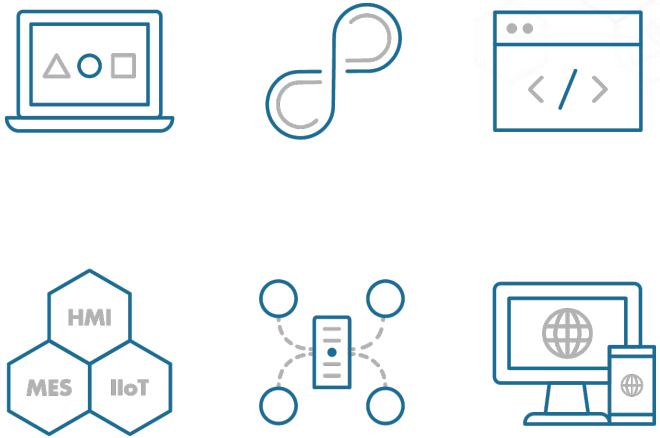
Mission Statement:

Our mission is to create industrial software that empowers our customers to swiftly turn great ideas into reality by removing all technological and economic obstacles.

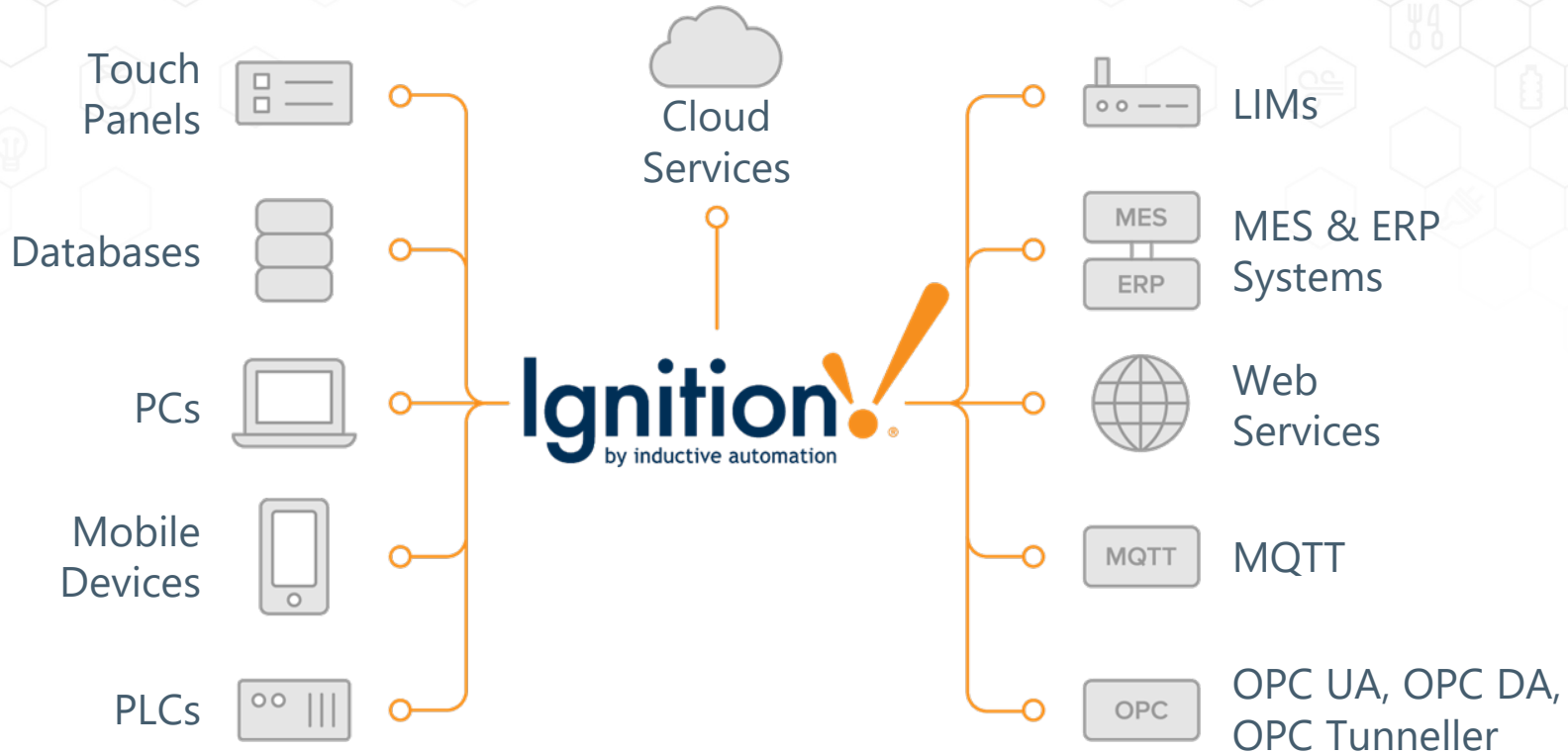
Ignition: Industrial Application Platform

One Universal Platform for SCADA, MES & IIoT

- Unlimited licensing model
- Cross-platform compatibility
- Supports containers
- Based on IT-standard technologies
- Scalable server-client architecture
- Web-managed
- Web-launched on desktop or mobile
- Modular configurability



Ignition as a Communication Hub



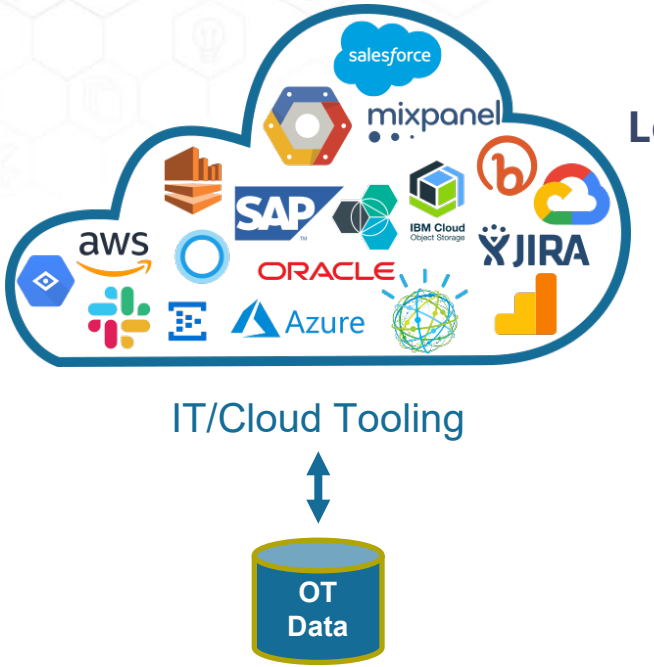
Digital Transformation Driving Big Data

Benefits

- Reducing Costs to achieve quick ROI
- Digitalization of Business Operations
- Greater Resource Management
- Greater Customer Insights
- Better Customer Experience
- Creation of Digital Products and Services
- Opening the Door to Globalization

The “Reality” of Industrial Digital Transformation

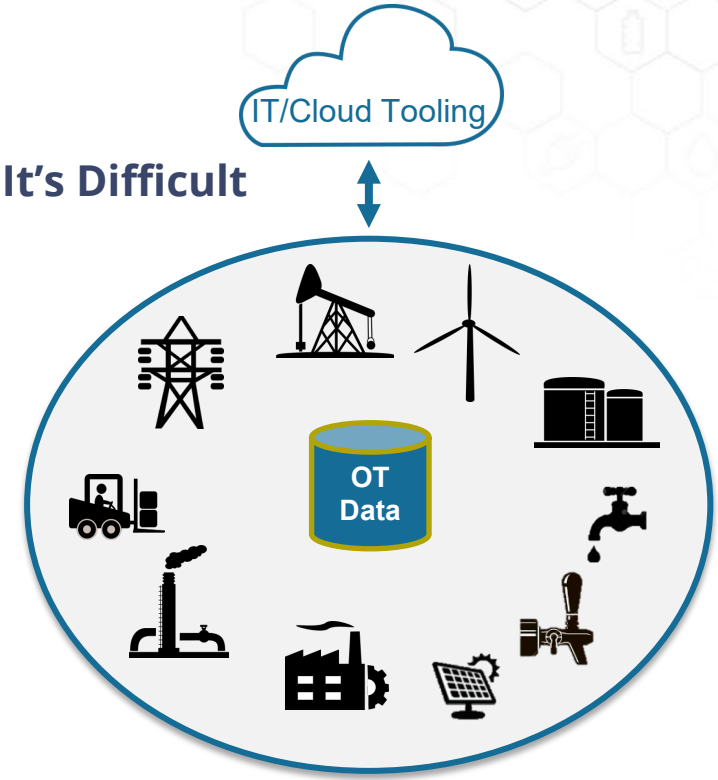
The Proposition



Looks Simple

The Reality

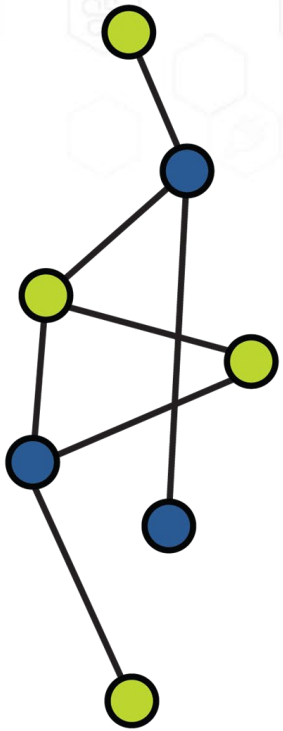
It’s Difficult



What's the Problem?

Many companies are striving to accelerate their Digital Transformation

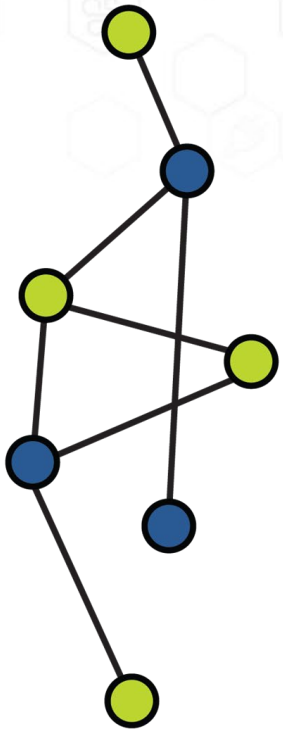
- Problems with bridging OT/IT gap
- Perception of needing to rip & replace
- Data problems



What's the Problem?

Problems with Bridging OT/IT Gap

- Not Cost effective
- Custom Code
- Not Scalable
- Proprietary Nightmares



OT Data versus IT Needs

OT Data Consists of

- Proprietary Protocols
- Multiple Data Formats
- No Contextual Information
- Designed for Operations
- Different Across Market Segments
- Poll / Response Date Retrieval
- Directly Coupled to Applications
- Isolated Networks

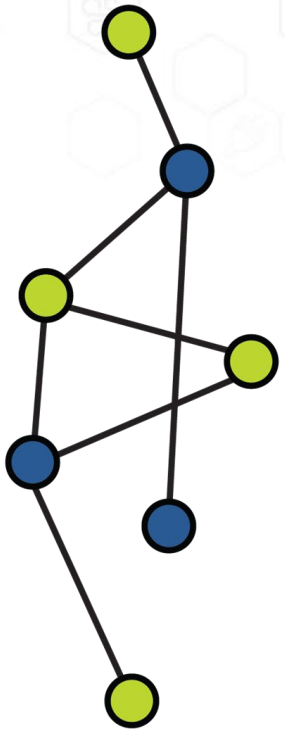
IT Data Needs

- Data Objects/Modeling
- Standard Data Formats
- Contextual Information
- Decoupled to Enterprise
- Publish / Subscribe Methodology
- Easy to Integrate
- Secure

What's the Problem?

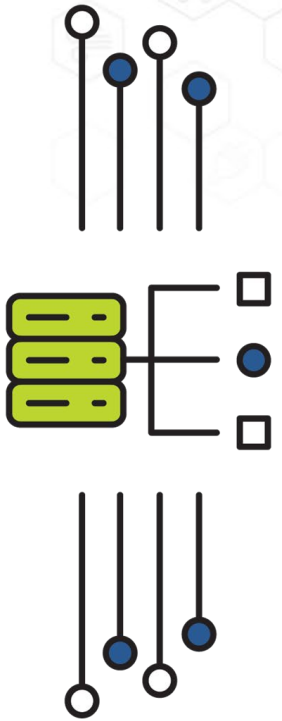
Progress is stymied by a slew of data problems

- Inefficiencies in accessing, preparing, and integrating data, and in making data available
- Data inconsistencies
- Lack of data context
- Data is not in a usable form



A Solution: DataOps & Edge Computing

- DataOps is an automated, process-oriented methodology, used by analytic and data teams, to improve the quality and reduce the cycle time of data analytics.
- DataOps addresses the data architecture needs of industrial companies as they adopt Industry 4.0, Digital Transformation, and Smart Manufacturing.
- Improves communication between data stakeholders
- Aligns data management with data goals



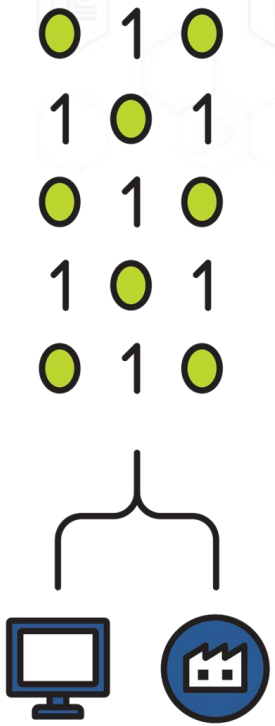
DataOps

- Also known as data harmonization or data cleansing, etc.
- DataOps has some similarities to DevOps: Both combine people, processes, and tools to deliver results more efficiently; both encourage the breaking down of silos.
- It is a methodology, rather than a product or solution, or a specific position or team in the organization.

DataOps

General guidelines for implementation:

- Democratize the data (i.e., make data available across the enterprise)
- Leverage platforms and open-source tools
- Build a model for your data
- Facilitate cooperation between departments



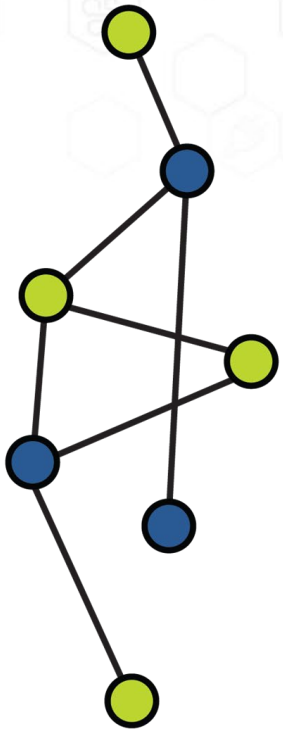
DataOps

- DataOps solutions perform data contextualization and standardization and provide secure data flow to the various consuming applications running at the edge, in on-premises data centers, or in the cloud.
- To implement a DataOps solution successfully, you need the right foundation.

Perception of Needing to Rip & Replace

Demands different approach

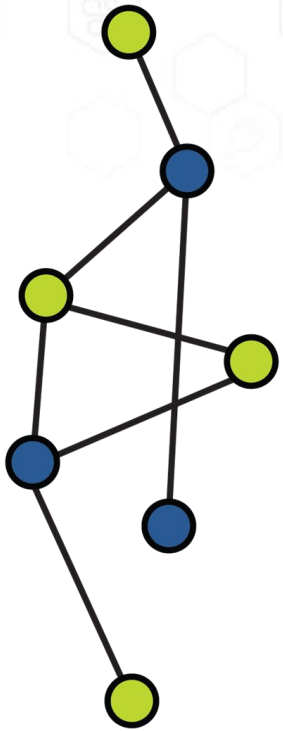
- Common obstacle
- Parallel infrastructure alongside existing infrastructure
- Transition from old system to new IIoT infrastructure
- Get ROI wins as you go
- Solve real problems
- Fund further projects
- Leverage open standards & platforms
- Simple cost-effective steps



DataOps Foundation

Important tenants

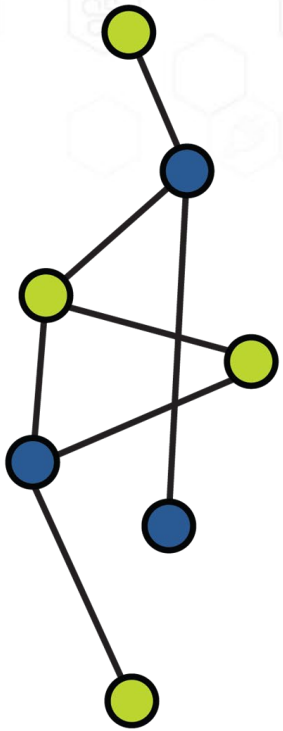
- Modular and open - does not own the data
- Interoperable & scalable
- Price-competitive & unlimited
- Easy to install, manage and configure
- Provides data connectivity: protocols, legacy devices, databases, web sockets, web services, and much more
- OT-driven and proven — and it bridges the gap between OT and IT



DataOps Foundation

Leverage tools on platforms — not coding on operating systems

- OS agnostic
- Scalable
- Easy to configure & maintain
- Provides standardization



DataOps Foundation

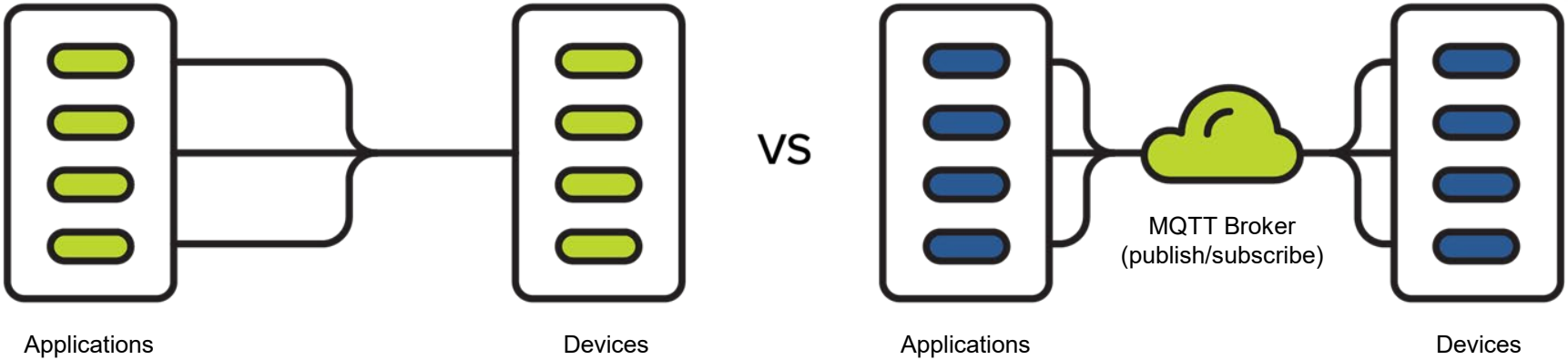
Provides Data Transformation / DataOps

- Connects to OT data
- Single source of truth
- Transforms proprietary protocols tags into proper tags naming
- Creates tools for creating data models/UDTs
- Provides metadata details such as scaling, eng units, etc.
- Auto-discovery of information:
- - Simple; connect and learn instantly
- - No human editing required, or other error-prone or costly activities

DataOps Foundation

Interoperable & Standards Based

- Decouples applications from devices, enabling easy connectivity to multiple consumers



Digital Transformation Utilizing MQTT & Sparkplug

MQTT Offers:

- Message Oriented Middleware
- Publish-and-subscribe infrastructure.
- Originally designed for a real-time, mission critical SCADA solution with the following design goals:
  - Simple – Easy to implement on very constrained devices
  - Efficient – Use as little bandwidth / footprint as possible
  - Stateful – Method in which to save on bandwidth
  - Open – No vendor lock-in

Sparkplug B Specification Offers:

- Defines an OT Centric Topic Namespace
- Defines an OT Centric Data Model
- Defines an OT Centric Payload
- Defines MQTT State Management
- Provides Tag Meta Data
- Supports Stateful Connectivity for Report by Exception and Control
- Supports Auto-Discovery
- Source of Truth of Model & Data at the Edge
- Store & Forward


Parallel

MQTT / HTTP

Sparkplug Provides Standard for Modeling OT Data

Sparkplug B Specification Offers:

- Defines an OT Centric Topic Namespace
- *Defines an OT Centric Data Model/Asset Structure*
- Defines an OT Centric Extensible Process Variable Payload
- Defines MQTT State Management
- Sparkplug establishes a *Single Source of Truth* for Models/Assets/Tags at the Origin!

Plug and Play Auto-Discovery:
- GroupID/NodeID/DeviceID - Where did this message come from.
- NBIRTH/DBIRTH – New Nodes/Devices to discover.
- NDATA/DDATA – Node/Device Process Variable Updates.
- NCMD/DCMD – Node/Device level command for bi-directional command/control.
- NDEATH/DDEATH – Node/Device Offline indication.

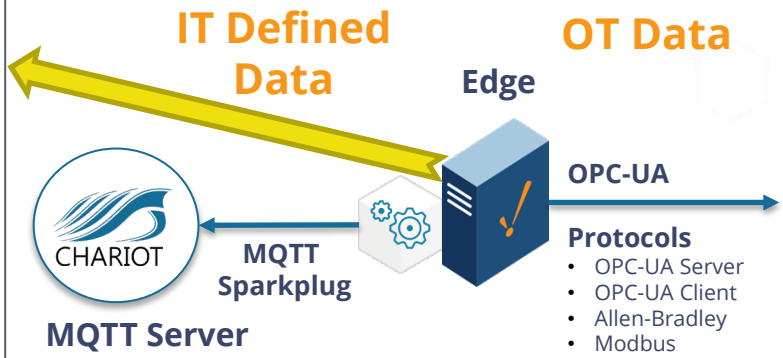
Define Models/Assets from the Edge:
The Sparkplug "Template Definition" specification allows NBIRTH messages to define Data Models. Sparkplug "Template Instances" allow BIRTH messages to create associated Assets from these Models.

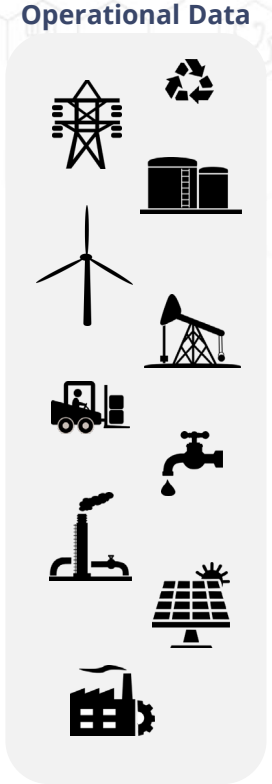
Efficient binary encoding of PV Objects:
- Name
- Value
- Timestamp
- Data Type
- Engineering Units/Ranges
- Quality
- ... Custom Properties as required

Proper MQTT State Management provides:
- Report by Exception
- Bi-directional for Command and Control
- Store & Forward

Using Ignition to Connect OT Data

- Single source of truth
  - Model
    - UDTs define data models
  - Asset
    - Instantiation of UDTs create Assets with associated process variable
  - Measurement (Tag/Process Variable)
    - Time stamp
    - Real value
    - Engineering units / range
    - Data type
    - Custom properties
- Quick-and-simple configuration
  - Use tools, rather than coding, for configuration
- Cost efficient
  - Data sent on change
  - Time series efficiency
- Scalable

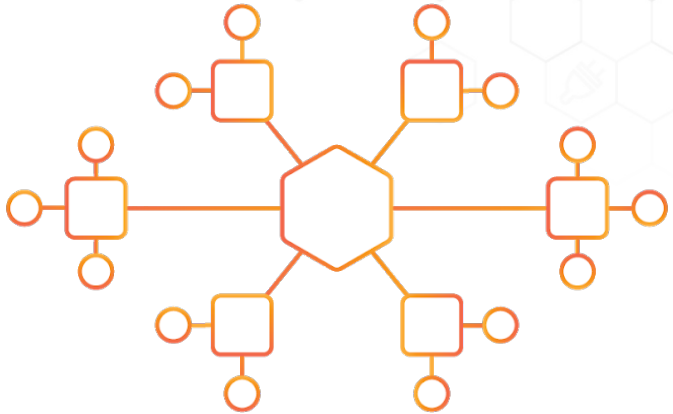




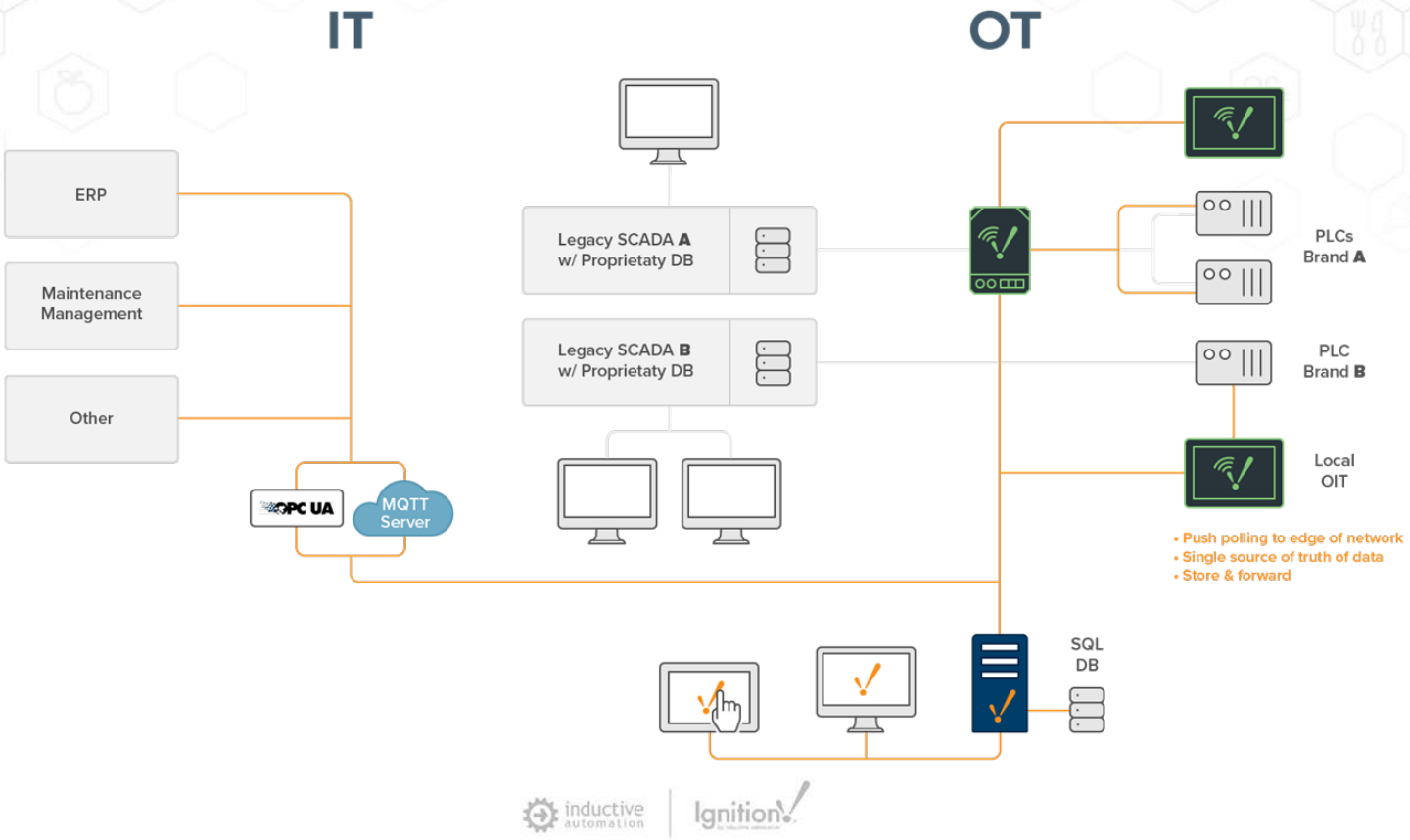
Edge Computing

Advantages of Edge

- Poll data at the source
- Poll at faster rates
- Get access to more data
- Efficiently provide data to infrastructure
- Add computing at the source (machine learning, analytics)
- More security
- True scalability



Edge Computing Architecture



New Sensors & Data

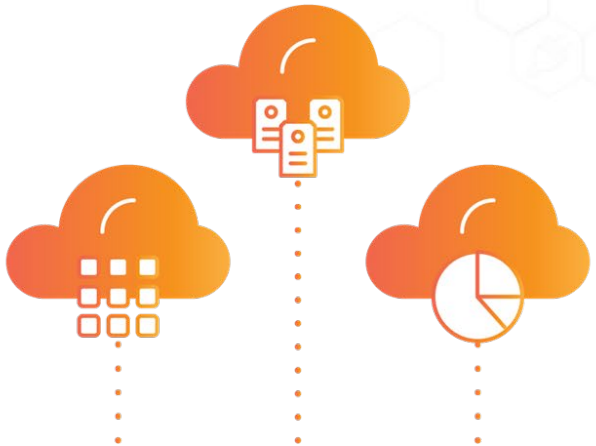
Opportunities with New Sensors

- Capture more I/O data
- Overlay onto existing network
- Connect to infrastructure
- Wireless technology
- Cost effective
  - No PLCs
  - No running conduit or power
- Plug and play
  - Leverages MQTT

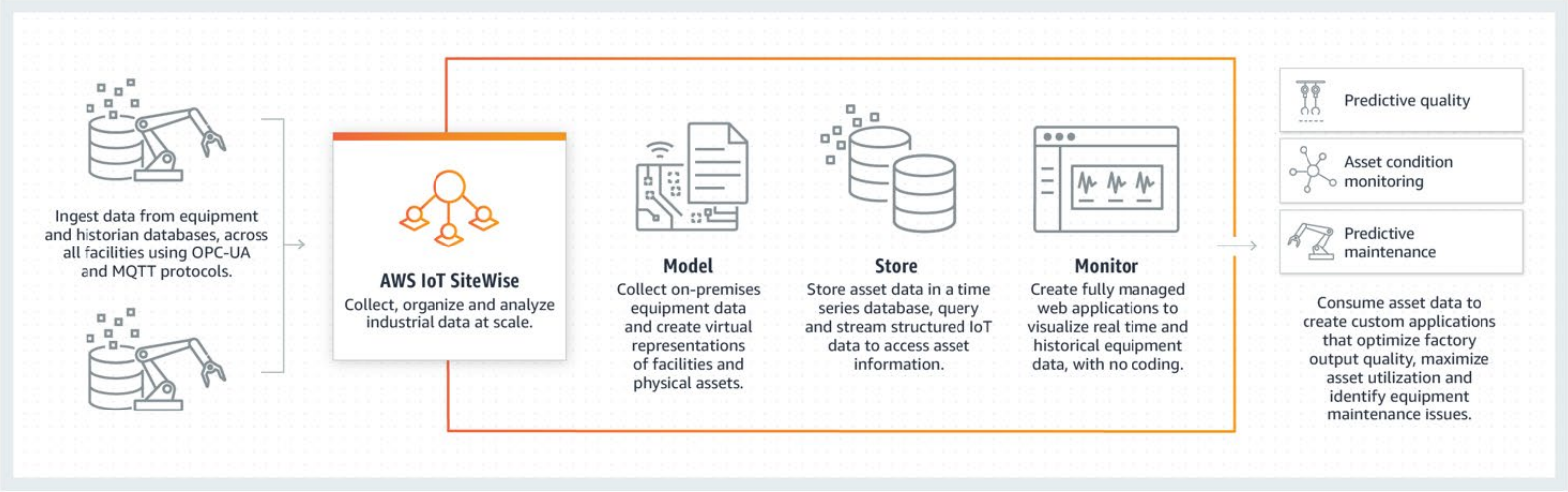
Leverage the Cloud

Seize Cloud Opportunities

- Easily deploy applications to the cloud
- Provide greater access
- Get unlimited storage and computability compared to on-prem
- Easily inject data in the cloud
  - AWS, Azure, Google, IBM
  - Get advanced analytics and machine learning
- Less overall maintenance
- Provide true scalability



AWS IoT SiteWise



AWS IoT SiteWise Offers:

- Service enabling OT data to be collected via MQTT or OPC-UA
- Provides a Data Model representation of the Assets
- Stores Measurements into Time Series Database
- Provide Standard API interface for applications to consume for AI, PM and other Big Data solutions.

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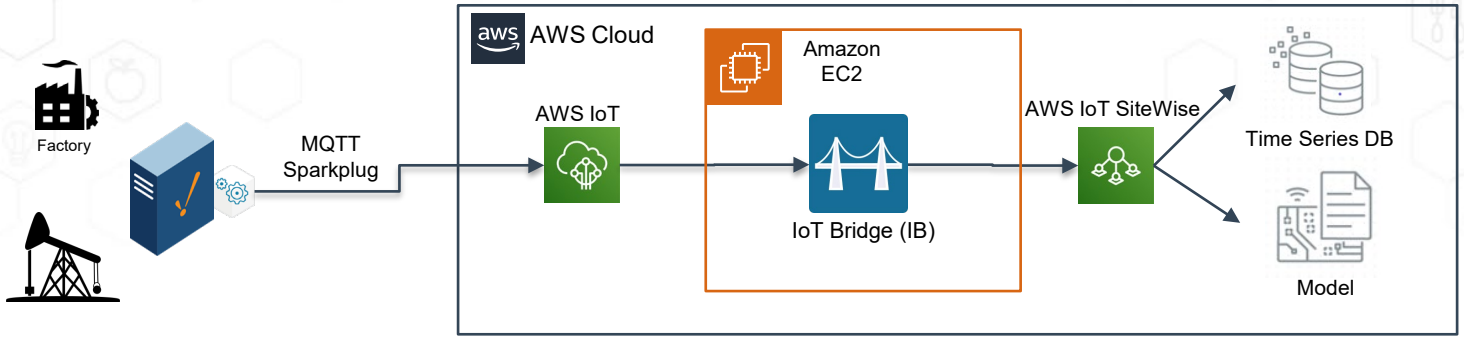
Putting All Together



The Edge

- Connect to OT Data
- Configure Machine Models as UDTs
- Instantiate UDTs to create Assets with Tags
- Convert Model/Asset/Tags to MQTT Sparkplug
- Connects to AWS IoT Core via MQTT
- **No Programming or Code Required**

IoT Bridge for AWS SiteWise

- AWS Marketplace AMI
- Consumes MQTT Sparkplug messages
- Auto-Creates Data Models in AWS SiteWise
- Auto-Creates Assets from the SiteWise Models
- RBEs Real-Time Tag Data to AWS SiteWise
- **No Programming or Code Required**

AWS SiteWise

- Provide Standard Interface to Applications
- Provides Data Models for Assets
- Provides Time Series DB for OT data
- **No Programming or Code Required**