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IoT Platform at the Edge

Edge Computing Drivers and Challenges

Business Drivers:

- **Low latency:** a need to act on data locally and fast
- **Solution economy:** no need to send all data to the Cloud
- **Data localization:** regulatory security and data privacy requirements

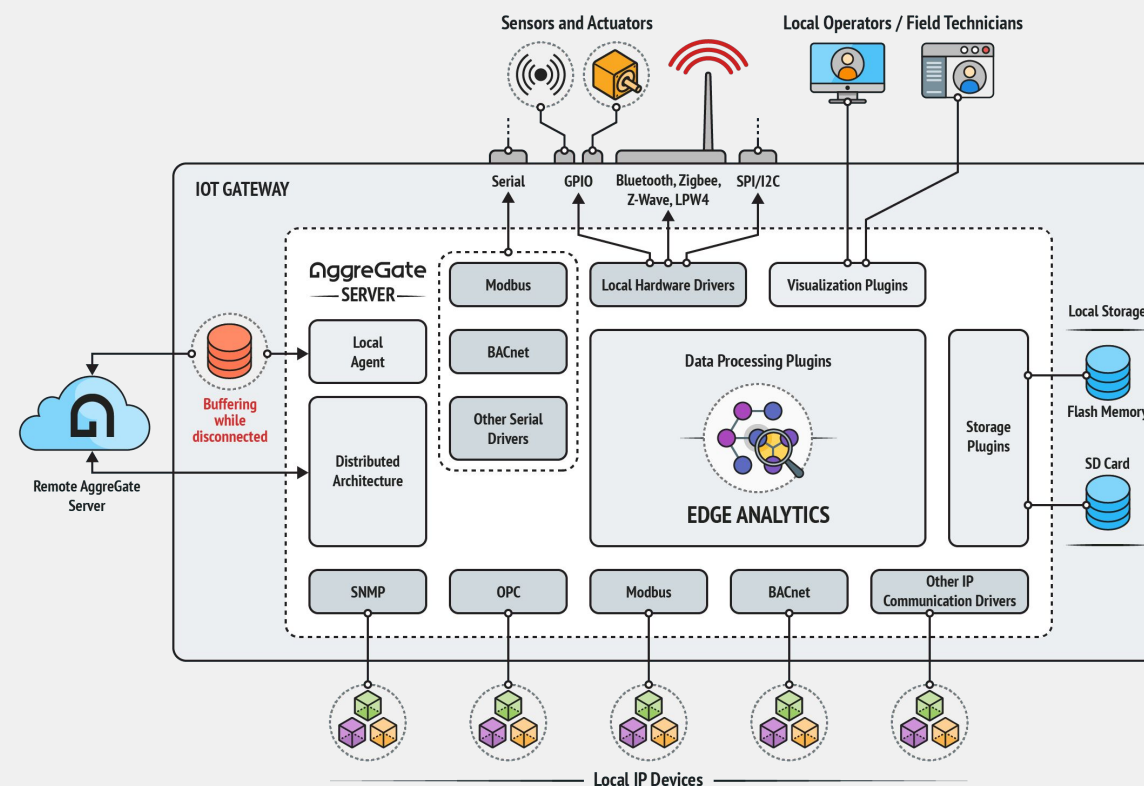
Challenges:

- **Skills:** lack of low-code tools for IoT solution development
- **Architecture:** applications running at the Edge and in the Cloud have different codes
- **Deployment:** data processing logic cannot be easily migrated between Edge and Cloud
- **Functionality:** a whole range of IoT functions is seldom available at the Edge

Redefining Edge Computing

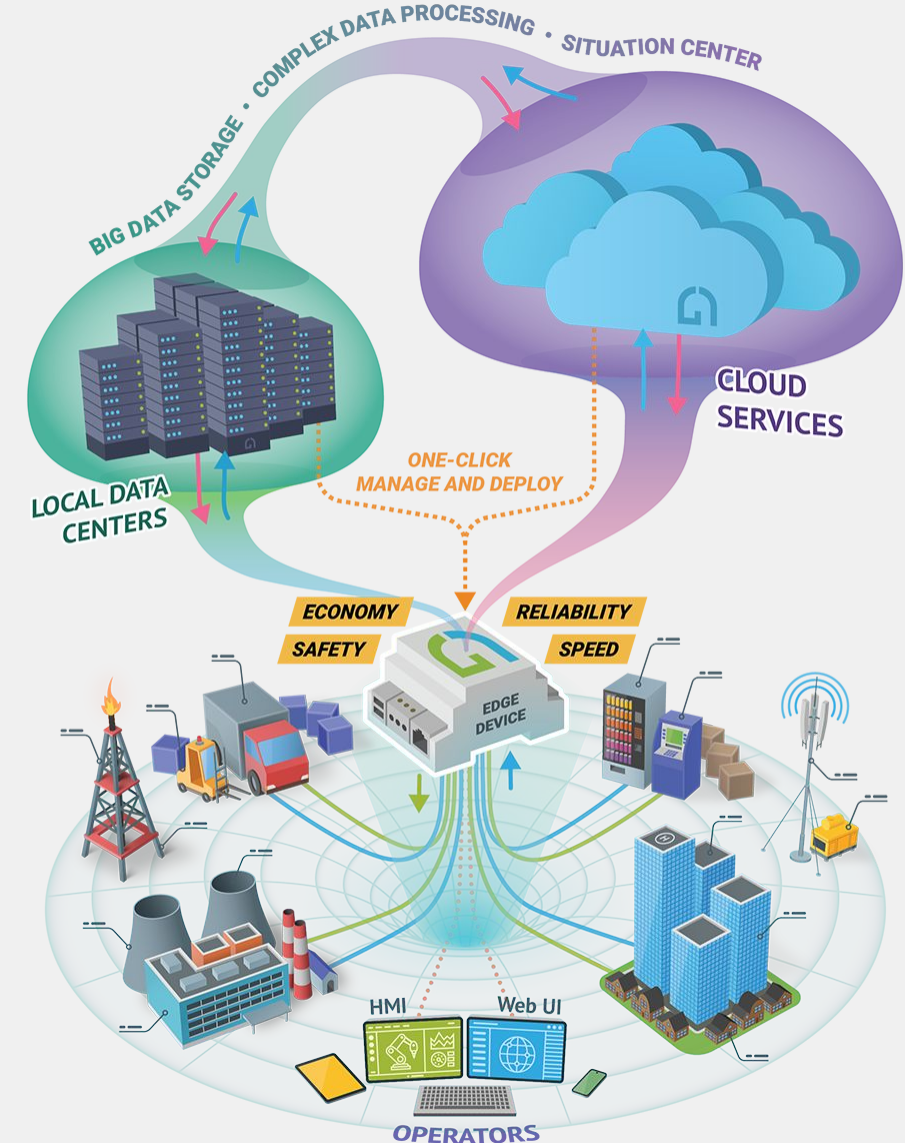
AggreGate redefines the Edge Computing paradigm by allowing to run the same IoT app on-Premises, on Edge and in the Cloud

- **Common platform codebase:** no efforts needed for re-design, re-development, re-testing and UAT while moving your app to the Edge
- **Modularity** allows to operate on low-cost hardware like Raspberry Pi, just disable unused plugins to fit into limited hardware resources
- Advanced control, easy upgrade and change management ensured by platform's **distributed architecture**
- Ideal to monitor, supervise and evolve a large number of remote facilities



AggreGate Edge for Digital Enterprise

- Helps to realize the full potential of digital transformation
- Brings the power of disconnected operation support and advanced analytics down to physical assets
- Acts as an intelligent connector between OT and IT worlds located next to infrastructure objects



AggreGate Edge Benefits

System Integrators, Engineering Companies, and Managed Service Providers:

- Fast creation and deployment of IoT solutions with low latency and local data protection requirements
- Creation of cost-effective solutions with reasonable Edge / Cloud computing balance
- Development of new added-value services on top of existing device networks

IoT Device (OEMs) and Independent Software Vendors (ISVs):

- Rapid embedded IoT application development
- Breakthrough advanced analytics components for Edge devices
- “Cloud-ready” connectivity modules for Edge devices
- Unified management for extensive device fleets

AggreGate Edge Advantages

- Wide connectivity options (industrial / consumer)
- Broad hardware platform and form factor support
- Modern Web-based end-user interface builder
- HMI-style interface editor for industrial touch panels
- High-performance CEP / Stream Analytics engine at the Edge
- Visual application development
- Embedded Machine Learning capabilities
- Seamless integration with AggreGate On-Premise and Cloud deployments
- Full-stack APIs and SDKs (REST, Java, .NET, and more)
- OEM customization and branding options

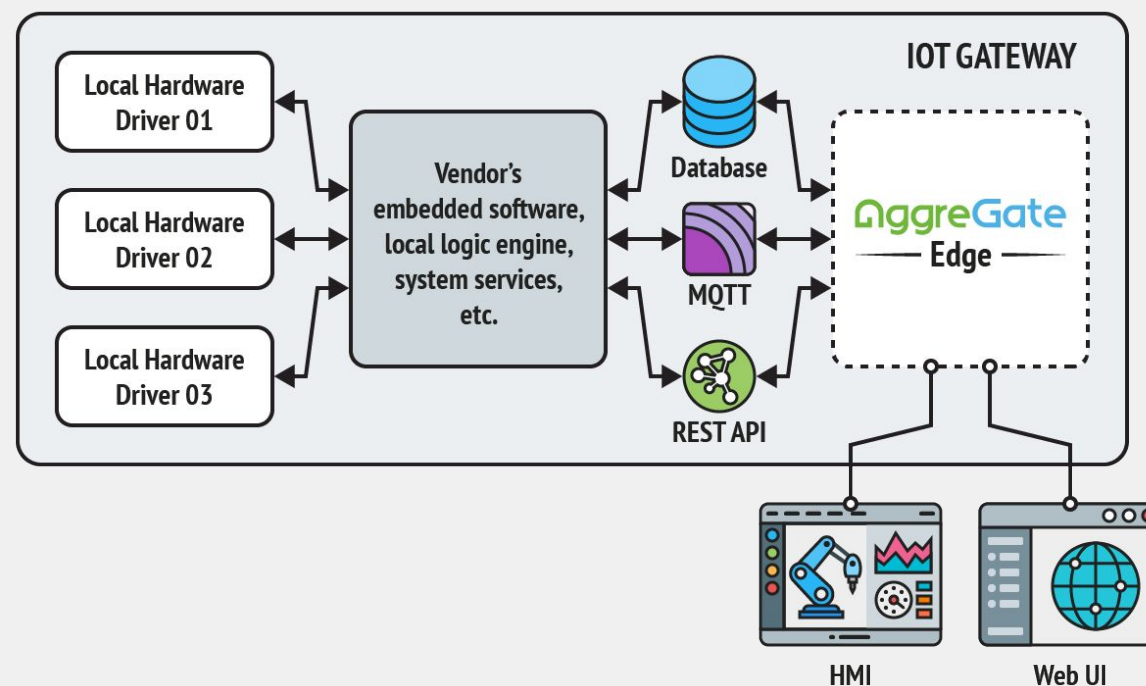


Edge Embedding Scenarios

Controllers with Built-in Software

- Smooth integration with OEM's embedded software
- Leverage of certified field bus protocol drivers included with controllers
- High-performance interaction with embedded software via MQTT, REST API or other open interfaces

Controller Architecture



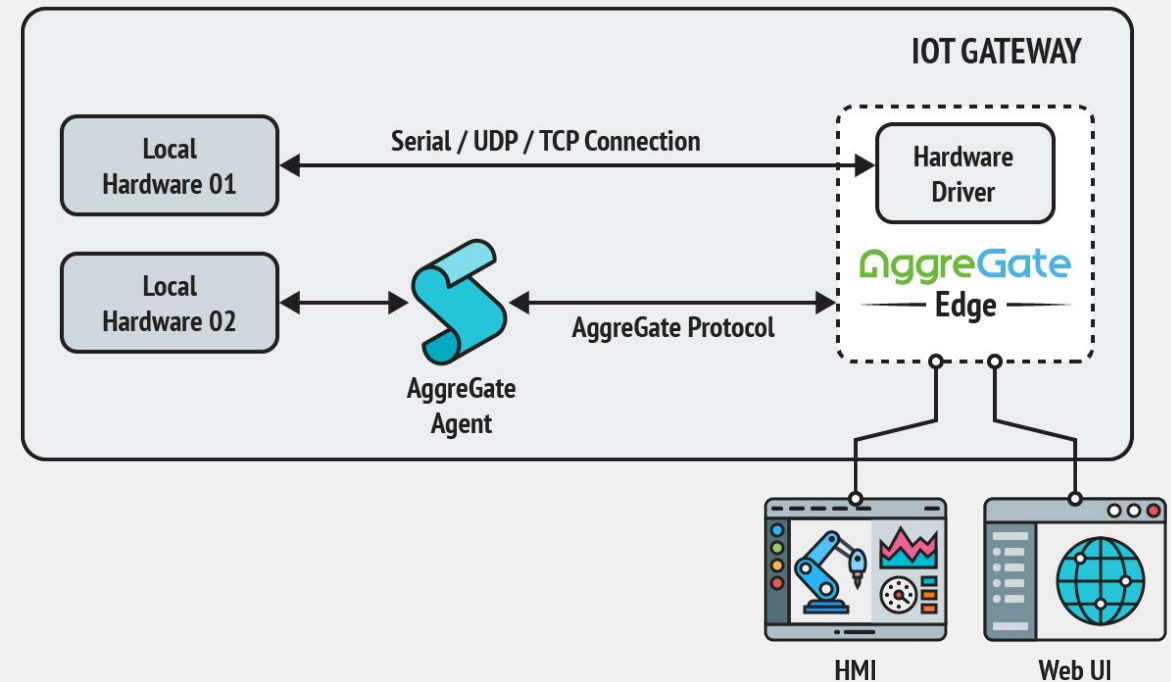
Controllers without Built-in Software

A complete solution for controllers with only Linux or Windows operation system installed.

AggreGate Edge enables:

- Connectivity
- Analytics
- Visualization
- API and SDK for extension

Controller Architecture





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Advantages in Detail

Extensive Edge Connectivity

- Plenty of connectivity options both for industrial and consumer scenarios
- Out-of-the-box support for key IoT, IT, automation and generic protocols (Modbus, BACnet, SNMP, MQTT, OPC, OPC UA, MBUS, IEC 104 and more)
- Flexible Driver enables visual communications setup for processing ASCII and binary streams flowing through TCP, UDP or Serial connections without writing a line of code
- Full-stack APIs and SDKs (REST, Java, .NET, and more)

Broad Hardware Platform Support

AggreGate Edge can operate on industrial controllers in severe environments and work on devices meeting the following minimal requirements:

- Linux or Windows operating system with Oracle JDK
- 1GHz CPU
- 512MB RAM



Single-Board PC



Linux-Based PLC



IoT Gateway



Industrial Touch Panel



Industrial PC

Edge Data Processing

- Device Discovery
- Delayed Configuration
- Event Management
- Alerts
- Statistics and Granulation
- Expression Language
- Query Language
- Machine Learning
- Scheduled Jobs
- Grouped Operations
- Data Replication
- Scripts (Java, Python)
- Workflows
- Complex Event Processing
- Models (variables, functions, events, business rules)

Edge Data Visualization

- Widgets
- Dashboards
- Data Grids
- Video Streams
- Reports
- Configurable Navigation
- Multi-level Drill-down
- Pixel-perfect Customization

Widgets are used as:

- Data Entry Forms
- Charts / Trends / Diagrams
- Human-Machine Interfaces (HMIs)
- Floor / Facility Plans
- Topology Graphs / Maps
- Geographical Maps etc.

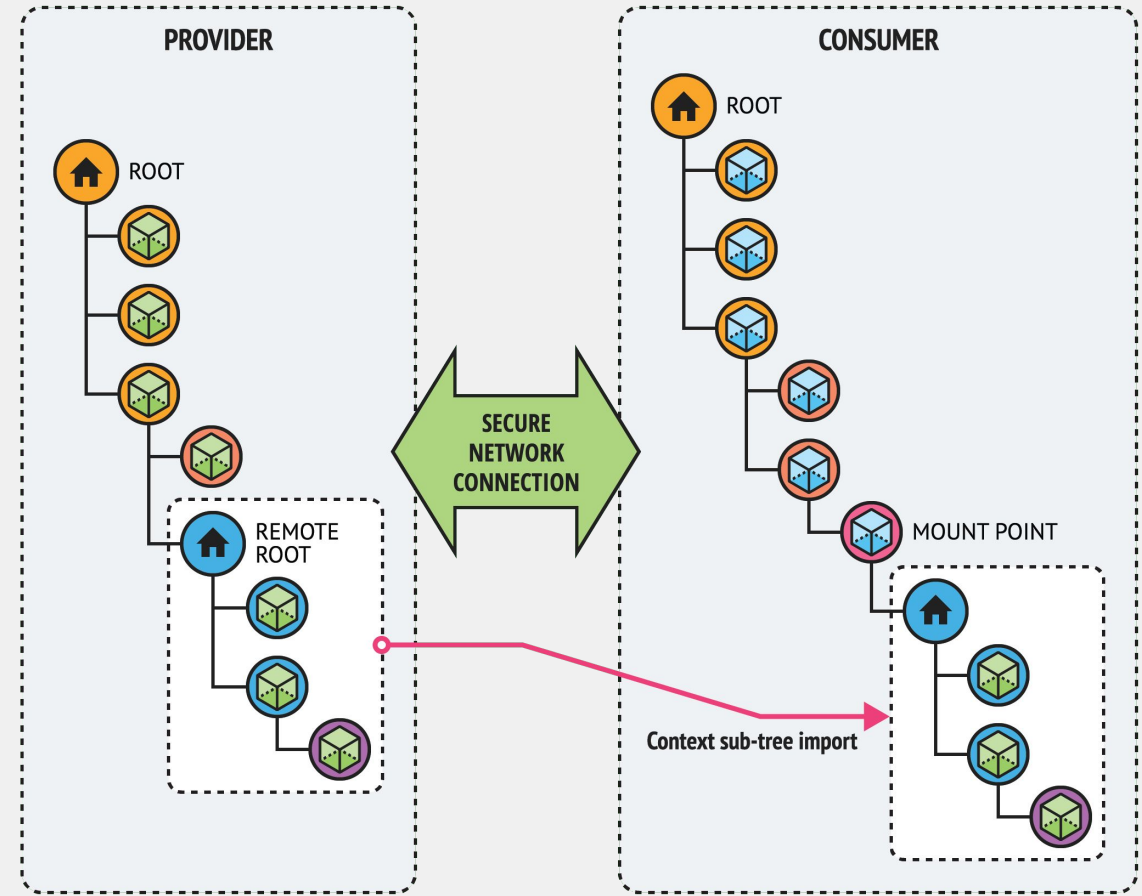
Web UI Builder

Low-code UI construction tool for business users who have zero experience in web application development

- Design of modern HTML5 interfaces based on modular CSS grids
- Dozens of built-in React components with easy third-party component integration
- Flexible component configuration and component library management
- Adaptive / responsive layouts support for desktops, tablets, and smartphones
- Comfortable design process for comprehensive nested UIs

Easy Integration with AggreGate Server

- Distributed Architecture
- Multi-tier vertical server hierarchies (e.g. Smart City)
- Multi-tier distributed installations (e.g. monitoring of a corporate network)
- Automatic deployment of business rules, models, widgets, ML models to Edge devices

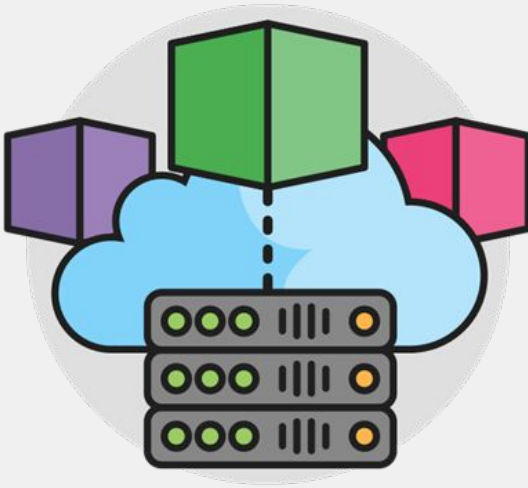




Deployment Options

AggreGate Ecosystem Deployment

Balanced for compliance and performance over private and public cloud environments



Hybrid
(Edge / On-Premise, Cloud)

As part of a big installation:

- Seamless logic transfer between AggreGate Server and AggreGate Edge
- Local data filtering and processing, no need to send everything to the Cloud
- Solutions with low latency, data protection, and regulatory requirements

Stand-alone Deployment



Edge only

Fully featured autonomous IoT solution on Edge controller

- Connectivity to IoT sensors and external data sources
- Local CEP, Advanced Analytics, and Machine Learning models execution
- Independent orchestration of multiple devices by one controller (Smart kiosk, Greenhouse, etc.)
- Interaction with Azure/AWS/Google cloud services



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Edge Use Cases

Smart City / Smart Building

IoT gateway with AggreGate Edge as a host for IoT mesh network

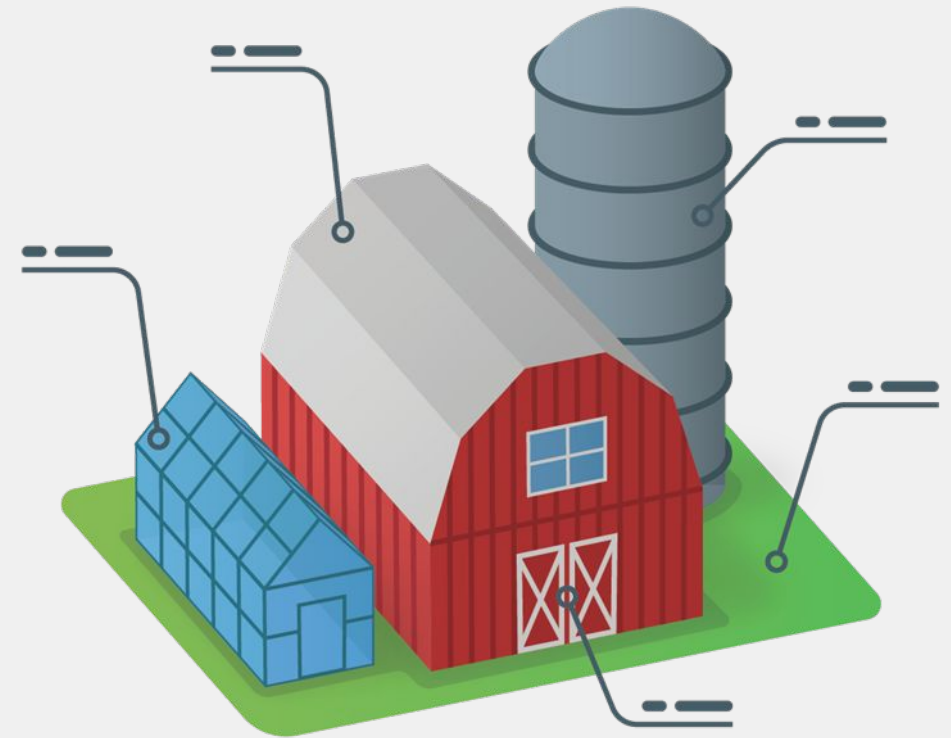
- Local data filtering, processing and analysis
- Autonomous decision making and execution
- Sensitive data protection with role-based access control
- Embedded AI scenarios support
- Asynchronous communication with cloud services



Smart Agriculture

IoT gateway with AggreGate Edge as a local control center for smart greenhouse or farm

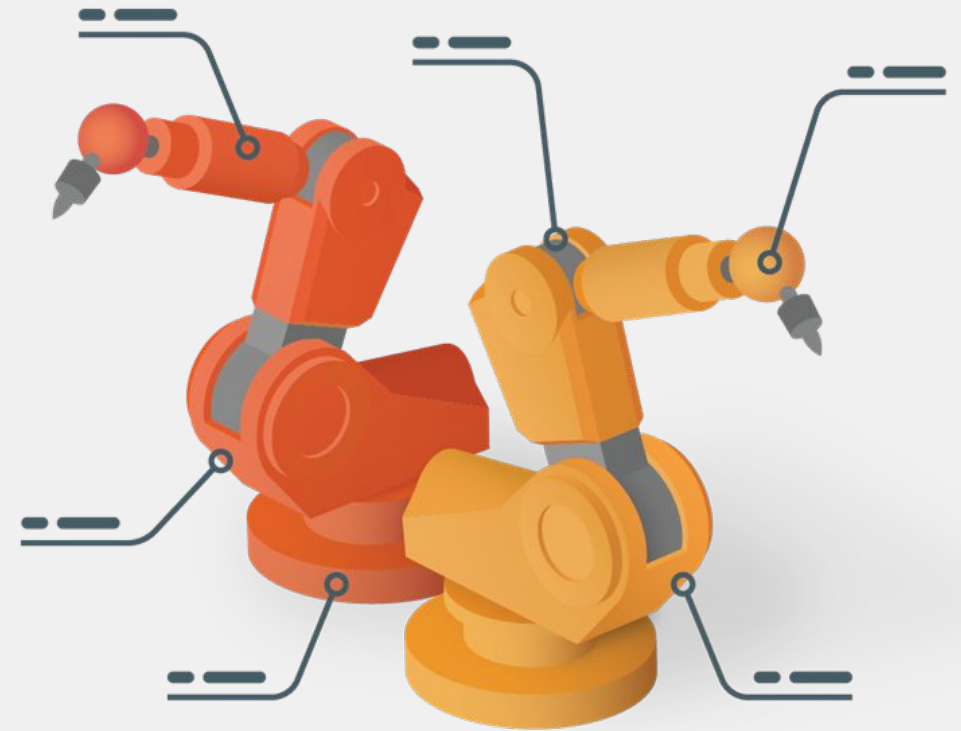
- Support of large sensor networks
- Independent ecosystem that operates smartly regardless of a Cloud connection
- Regulatory compliance reporting that keeps data private and reduces Cloud service usage costs



Industry 4.0

IoT gateway with AggreGate Edge in industrial and off-shore automation

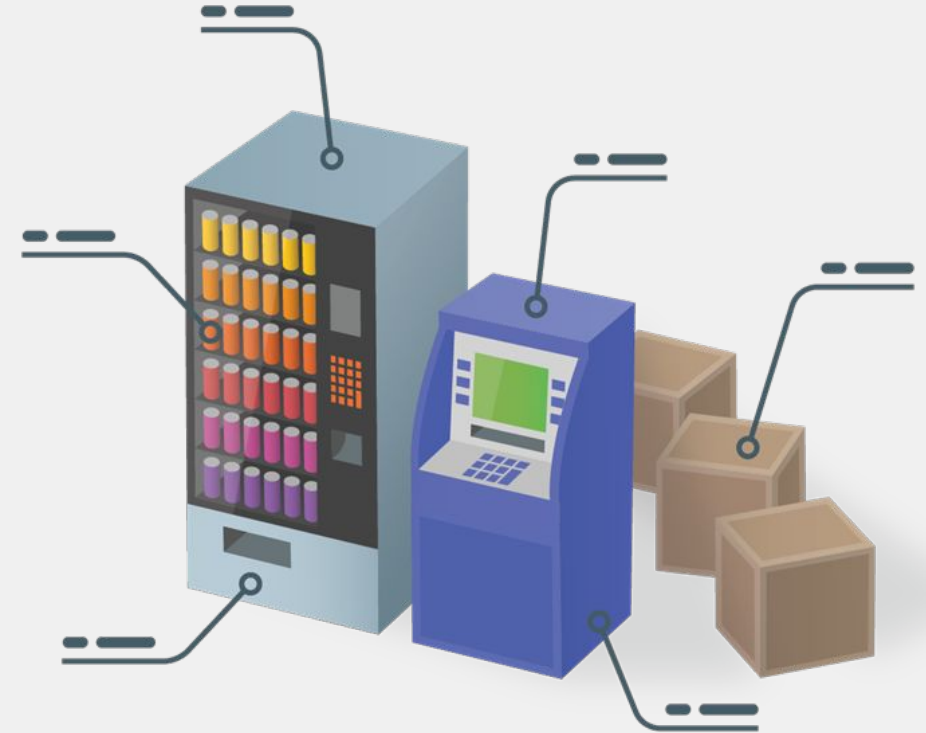
- Integration with existing SCADA enables full-featured Edge analytics close to automated processes
- Autonomous industrial equipment usage monitoring and access control
- Assembly lines monitoring via RFID / NFC
- AggreGate Edge as SoftPLC (IEC 61131-3 runtime and IDE)



Smart Terminals

IoT gateway with AggreGate Edge as a command center in Information Kiosks and Vending Machines

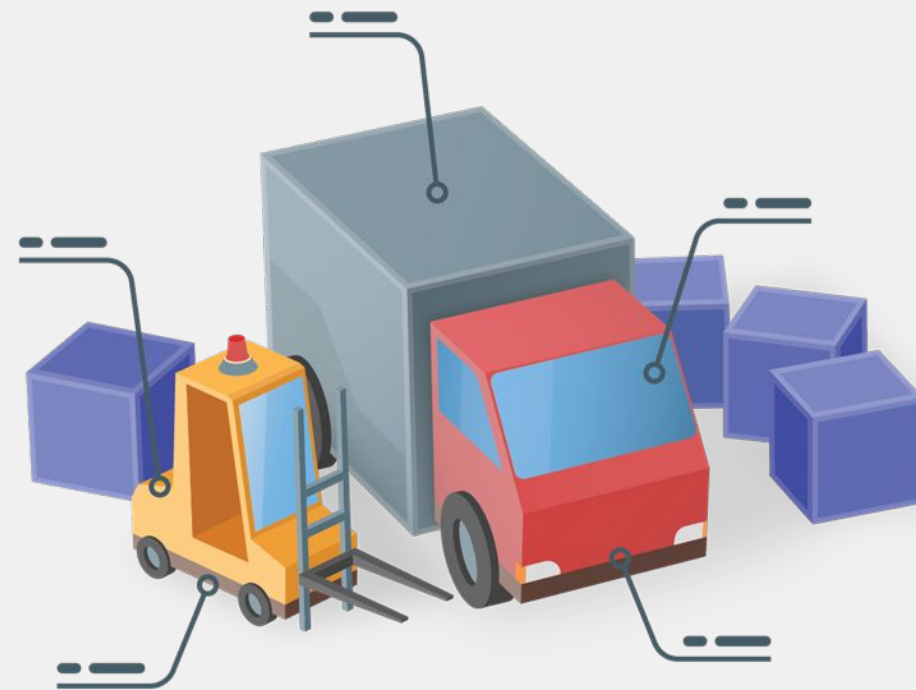
- Condition-based maintenance without sending all data to the Cloud
- Advanced local restocking and pre-kitting analytics
- Advanced environmental analysis without using heavy Cloud services for improved customer experience



Advanced Fleet Management

IoT gateway with AggreGate Edge as a local automation hub for specialized vehicles and small ships with hundreds of custom I/O channels

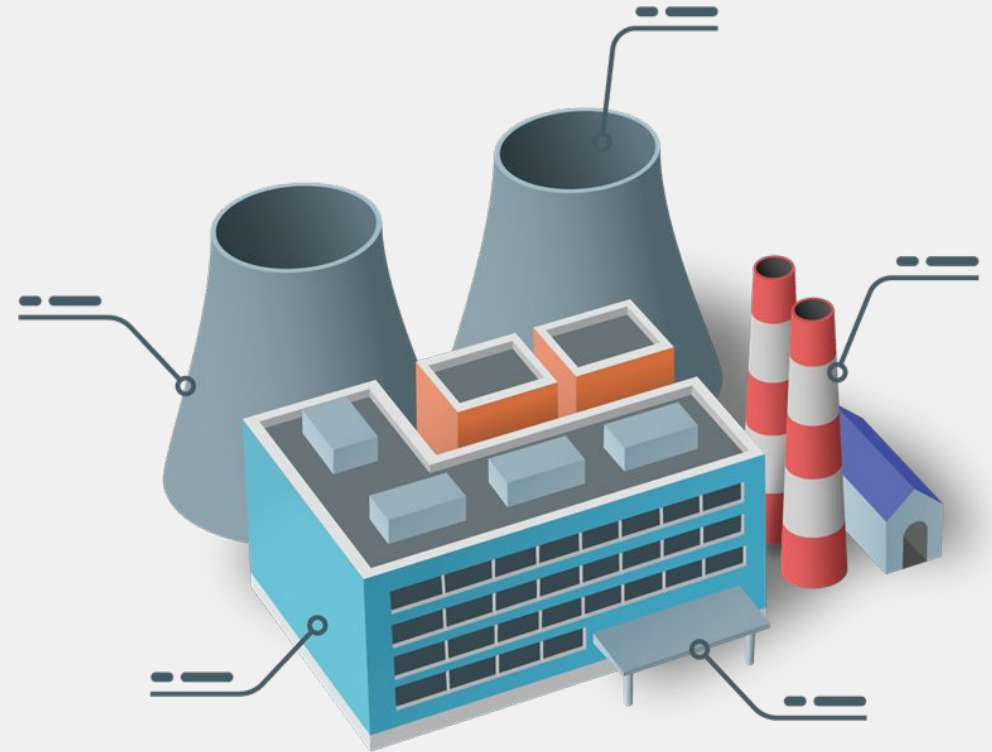
- Route-based analytics for insurance, operator supervision, and predictive maintenance
- Fuel consumption analytics, service checklist enforcement, etc.
- Easy integration with cloud-based Fleet Management solutions



Retrofitted Engineering Infrastructure

IoT gateway with AggreGate Edge as a one-stop assistance center for installer firms supporting old infrastructure

- Configuration and debugging of peripherals in large engineering installations
- Low-level equipment monitoring (e.g., field bus hardware)
- Billing and regulatory reports on equipment operation



Smart Retail

IoT gateway with AggreGate Edge as a local control center

- Connect legacy equipment to IoT Platform for advanced operational analytics
- Autonomous critical infrastructure monitoring and condition-based maintenance (fridges, climate control)
- Handy HMI applications for information terminals





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Sales Information

AggreGate Edge Pricing and Licensing

3 Editions of AggreGate Edge* (Free, Standard, Premium), licensed by:

- Number of devices (tags) and widgets
- Protocols supported
- Modules included (Reports, Machine Learning, etc.)
- Events per day

** AggreGate Edge license can be used on controllers with one or two CPU Cores*

AggreGate Edge Editions

Metric/Edition	Free	Standard	Premium
Total variables (tags)	50	500	5 000
Events per day	10 000	100 000	Unlimited
Widgets	3	10	Unlimited
Minimal order, licenses	1	10	10
Included modules	20 essential drivers: Modbus, M-Bus, MQTT, HTTP, SNMP, ...	Free Edition modules + Flexible, GPS Tracker, SIP	Standard Edition modules + BACnet, Database, IEC-104, OPC ----- Distributed architecture Unified search Geo-fence LDAP authentication Reports Machine learning module

Tibbo
SYSTEMS



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Check our website: **aggregate.digital**

