Adapdix EdgeOps™ Platform

Enabling Autonomous Systems

Over the last ten years, contemporary manufacturers have been on the digital transformation journey commonly referred to as Industry 4.0. During this time, they focused on strategies that merged digital systems with the physical world of manufacturing to optimize operational performance and flexibility. Success required better equipment connectivity and typically resulted in deployment of technologies like Industrial IoT, advanced robots, and simulation solutions. Additionally, many implemented cloud big data analytic solutions to combine their IT and OT data in cloud data lakes in hopes of achieving more meaningful analytic insights. Some have recognized gains from their efforts, while others are stuck in "Pilot Purgatory."

Today manufacturers must ask what's next? How do they meet their never-ending productivity goals and launch their plants into the next industrial revolution – Industry 5.0 – where humans and machines interact seamlessly to optimize their operations? Adapdix is helping by building software for autonomous systems that brings modern technologies like AI/ML, process mining, task mining, adaptive control, and containerization to the plant floor real time data environment. Additionally, Adapdix offers new strategies in edge data management that brings contemporary capabilities to managing IT/OT data allowing their customers to scale autonomous applications from the equipment to the enterprise level. Their mission is to bring AI to the data, where the data lives, helping manufacturers achieve the promise of autonomous operations.

All of this comes together in Adapdix EdgeOps™, a software platform for edge-to-cloud applications integrated as part of the Adapdix DataMesh that combines advanced artificial intelligence and machine learning (AI/ML) analytics and management with a distributed data mesh technology and containerized architecture to enable the autonomous operation of advanced manufacturing environments. EdgeOps Platform's low-code inferencing model captures, stores, and analyzes real-time data at the edge, delivering predictive data intelligence and autonomous control for advanced production environments in milliseconds.

Unlike other automation technologies, the EdgeOps Platform offers:

Adapdix DataMesh

Collect multi-variate information directly from distributed data sources and perform advanced data analysis, process mining, and task mining in a time-sensitive context. The edge-first architecture maintains data close to the source allowing the data to remain geographically distributed while providing a single pane of glass view. Ultimately this enables cross-location query capability for data scientists/analysts without the costs or latency of moving data to a central location.

Integrated MLOps

The EdgeOps Platform is a single environment where data scientists can perform exploratory data analysis, run model experiments, train models, deploy them directly on edge hardware, and continuously monitor their performance. Integration with third party model registries is possible but not required.
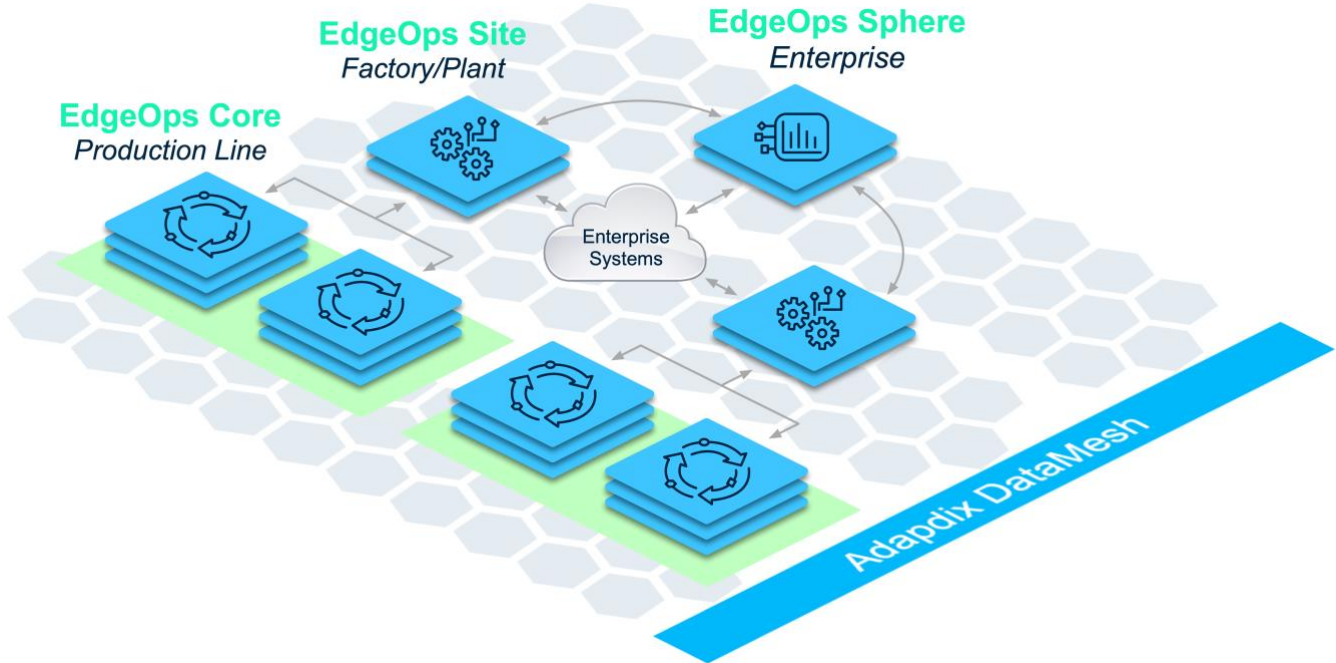
Autonomous Control

Industrial processes and controllers can incorporate real-time analytics provided by the platform for use cases like dynamic setpoint adjustment or process optimization, allowing the equipment to react to changing conditions as they occur within milliseconds. Enabling response automation for end-to-end process control.

KEY FEATURES

- Multi-Source Distributed Data Collection, Storage, and Analytics
- Integrated MLOps with Edge-Native AI/ML Inference
- Autonomous Control for Ultra-low Latency Anomaly Correction
- Low-Code Graphical Data Flow Builder
- Self-Learning Models and Drift Detection Auto Retraining
- Inexpensive, Non-disruptive Deployment Model
- Strengthen Hybrid Cloud Architecture
- Process and Task Mining

CUSTOMER BENEFITS

- Reduced Downtime and Increased Production
- Capex Avoidance
- Reduced Cloud Costs
- AI-Based Product Quality and Compliance Control
- Predictive Operational Efficiency and Remote Observability
- Simplified Quality, Testing and Safety Compliance

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ARCHITECTURE OVERVIEW

The Adapdix EdgeOps Platform is designed to help customers create autonomous, self-healing manufacturing lines, while scaling AI/ML and data management to an enterprise wide, multisite view for a self-service architecture powered by the Adapdix DataMesh. The containerized architecture allows continued innovation and enables customers to flexibly deploy the platform in a variety of topologies leveraging distributed edge resources where they exist, at the source of the data. The architecture strengthens hybrid cloud environments by moving AI/ML capabilities close to the real time data being generated.

Three core offerings make up the Adapdix EdgeOps Platform: EdgeOps Core, EdgeOps Site, and EdgeOps Sphere – all integrated as part of the Adapdix DataMesh. Combined, these provide seamless scaling from a single piece of equipment to thousands of geographically distributed manufacturing processes across multiple factories and cloud endpoints. This allows customers to start small and expand as their return grows.

The diagram above demonstrates the EdgeOps™ Platform hierarchy.

EdgeOps Core	EdgeOps Site	EdgeOps Sphere
▪ **Unify operational data** right on the equipment leveraging the Adapdix DataMesh ▪ **Lightweight autonomous software** deployable on small hardware ▪ **Optimized for low latency**, reacting in milliseconds ▪ **Real time data processing** for time-critical close loop optimization ▪ **Low latency AI/ML** model execution for autonomous control, response automation ▪ **Short-term datastore** for granular insights	▪ **Integrate information technology data** leveraging the Adapdix DataMesh ▪ Data analytics and visualization for **site-wide equipment comparisons** ▪ **Integrated MLOps** for AI/ML lifecycle management ▪ **Aggregate multiple EdgeOps Cores** into a single management plane ▪ **Data routing** with comprehensive user interface ▪ **Long-term datastore** hosted at the edge	▪ **Single point of access** to the Adapdix DataMesh ▪ **Enable enterprise use cases** with visibility into multiple geographically distributed plants ▪ Easily compare data **across facilities in a single, unified view** ▪ **Lightweight hardware** requirement hosted on existing edge infrastructure or in the cloud ▪ **No central data store or duplication**, returns data directly from the source on demand ▪ End-to-end **process and task mining**

To learn more about Adapdix and the EdgeOps Platform visit adapdix.com.

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