CloudGeometry

Semiconductor Fab: AI-Enhanced Real-time Equipment Health Check

Case Study

IMANTICS

AI-Enhanced Real-time Equipment Health Check

SaaS platform with Machine Learning capabilities to track health of industrial equipment, proactively discover anomalies and prevent downtime.

IMANTICS

INDUSTRY

Semiconductor Manufacturing

SOLUTION

AI, Real-time data integration, Machine Learning

CLIENT

Imantics

cloudGeometry

Imantics

Imantics provides a cloud-based platform specializing in semiconductor device fabrication through IoT. Catering to large-scale fabs with diverse manufacturing automation solutions, Imantics' solutions could be deployed on-premise, as SaaS, or in a hybrid cloud model. Following their initial focus on leveraging IoT for improved yields and process uptime, they looked for new ways to scale up leveraging of insights from their installed base to facilitate further gains in time to market for customers.

The Challenge

Semiconductor fabs operate on meticulously timed end-to-end manufacturing flows. Any interruption, even a brief five-minute machine malfunction, can halt the entire pipeline, leading to significant financial losses and destruction of work-in-process material. With the rise of network-connected devices, competition has intensified, placing new pressure on yields in the face of more complex devices and semiconductors with even more stringent requirements. Imantics, relying solely on IoT, faced challenges in preemptively identifying and addressing potential malfunctions in fab lines.

Cleaner ML-ready data updated continuously

Stream machine-originated data into the platform, define data transformation and processing rules

Closed-loop development for IIoT

Fully automated DevOps pipeline; configure & deploy new device payloads in minutes, not weeks

Fast, frequent, and repeatable

Integrated CI/CD automation for frictionless, agile business innovation

CloudGeometry

Imantics

The Solution

A crucial advantage an AI-driven approach to improving a baseline set of data and analytics brings is accelerating the cycle time-to-insights far faster than humans ever could.

- Transition to AI-Driven Analytics: CloudGeometry transformed Imantics' cloud platform, integrating AI to analyze diverse data types and input streams. This new capability enabled predictive malfunction alerts and real-time preventive measure recommendations.

- Deep Learning Integration: AWS Sagemaker was employed to train deep learning models on historical IoT data, enabling the prediction of equipment failures. These models, along with MLOps pipelines that detected drift and enabled continuous training, refined their accuracy over time.

- Real-time Anomaly Detection: Kinesis stream processing was introduced to detect anomalies in real-time IoT device payloads, offering operators early warnings before potential malfunctions.

- Smart Data Processing: AI algorithms were implemented to decide optimal data processing methods, choosing between Spark in-memory transformations or batch processing via EMR.

- As Imantics onboarded different manufacturers with diverse IoT data capture requirements, CloudGeometry's CI/CD solutions allowed more frequent, more granular updates, streamlining the onboarding process and cutting setup the time between runs for different devices or requirements.

Better integration of analytics in all the key steps of IoT enabled manufacturing process monitoring technology significantly increased the value of Imantics solutions, turning potential insights into practical improvements that are immediately applicable to semiconductor manufacturing customers.

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The Benefits

The introduction of AI by CloudGeometry transformed Imantics' development and deployment processes. With the capability to adapt to data stream changes and refine machine learning models continuously, Imantics' customers experienced unprecedented improvements in yields. The shift from a solely IoT-based platform to an AI-driven approach ensured predictive and real-time equipment health checks, minimizing downtime and maximizing efficiency.

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CloudGeometry

Technology Solutions & Services
to build, optimize and run your cloud software and operations.

CloudGeometry

TECHNOLOGY SOLUTIONS

APPLICATION MODERNIZATION
Transform Legacy Systems
for Future-Ready Innovation

AI & DATA
Achieve breakthrough automation and analytic
insights via cutting-edge data strategies

CLOUD COST MANAGEMENT
Optimize Cloud Spending
for Maximum ROI and Efficiency

SECURITY AND COMPLIANCE
Reinforce your cloud infra, workload,
operations, and development end-to-end

FOUNDATION SERVICES

CLOUD INFRA & OPS
Robust Infrastructure Solutions for Seamless
Operations

- DevOps as a Service
- Managed Cloud Operations
- Cloud Spend Optimization
- Resilience, Continuity & Backup
- AWS Well-Architected

MODERNIZATION & MIGRATION
Smooth Transitions to Modern Architectures
with Minimal Disruption

- Application Modernization
- Kubernetes Adoption
- AWS Database Migration
- Data Engineering Operations
- Data Integration
- Data Migration
- Cloud Migration & Adoption

ADVANCED SERVICES

CLOUD-NATIVE DEVELOPMENT
Build Scalable, Resilient Applications with
Cloud-Native Technologies

- CI/CD
- Multi- Platform App Design &
  Development
- Cloud-Ready Teams
- Enterprise SaaS Modernization
- Multi-Tenancy SaaS
- B2B Customer Success Engineering

CLOUD-NATIVE OPERATIONS
Streamline Operations with Advanced
Cloud-Native Practices

- Platform Engineering
- Workload Management
- Monitoring & Observability
- Infrastructure Management

AI/ML & DATA SERVICES

AI/ML & DATA
Leverage Advanced Analytics and Machine
Learning to achieve exponential acceleration in
the ROI of your data assets

- AI/ML Engineering for Data Analytics
- Generative AI
- Traditional ML for Data Analytics
- AI/ML Development and and Data Science
- Data Engineering for MLOps

CloudGeometry

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CloudGeometry delivers expert technical services, helping our clients unlock the full potential of cloud-native open source tooling and commercial platform technologies.

With roots in Silicon Valley, we've seen firsthand what works (and what doesn't). Count on CloudGeometry to accelerate application modernization, Kubernetes adoption, developer enablement, secure multi-tenancy, AI/MLOps, DevOps automation and more.

- As **AWS Advanced Consulting** partners, our certified solution architects and platform engineers help address the range of challenges facing enterprise innovators and venture funded startups alike.

- The **Cloud Native Computing Foundation** has accredited us as a **Kubernetes Certified Service Provider**.

- We serve as charter contributors to the **Linux Foundation Data & AI Commons** (LF Data & AI), supporting a diverse, sustainable ecosystem for open source data and AI technologies.

Over the last decade, we've built and deployed hundreds of big, fast full-stack apps with well-engineered cloud infrastructure across industries: Financial Services, Industrial Automation, Healthcare, AdTech, Consumer-grade Mobile, smart devices, and more.

From enterprise upgrades to data engineering to cloud-native scale-out, CloudGeometry helps you plot the shortest path across all dimensions of modern cloud software engineering.

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SaaS

Amazon Kinesis

AWS Lambda

Amazon Redshift

AWS Database Migration Service

kubernetes CERTIFIED SERVICE PROVIDER

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