AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

GPS313

Building a manufacturing data and analytics platform on AWS

Nishant Saini (he/him)
Partner Solutions Architect
Amazon Web Services

Adam Frowein (he/him)
Partner Solutions Architect
Amazon Web Services

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Agenda

01 Industry challenges and aspirations

02 Industrial data platform deep dive

03 Interactive session

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Industry challenges and aspirations

Common challenges for Operations Technology teams

- Integration of disparate data silos across organization – trust of data
- High cost and effort to manage OT systems and data
- Reports and dashboards are not enough – many manual processes

The aspiration: becoming a data-driven organization

- Fully managed systems – scale based on data sources and volume
- Single, secure data repository for operations and machine learning (ML)
- Automated workflows that drive insights to actions

aws

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Key manufacturing analytical use cases

Product and asset optimization	Quality management	Worker safety and productivity	Smart products and machines	Supply chain management	Engineering and design
• Machine availability (predictive maintenance) • Machine performance (efficiency) • Capacity utilization • Energy consumption • Sustainability and carbon emissions	• First pass yield • Roll throughput yield • Warranty returns • Defect root cause analysis • Returns and warranty claims	• PPE and contact tracing compliance • Worker productivity • Optimized field-force scheduling • Task automation	• Predictive service/intervention • Product use recommendations • Product upgrades recommendations • Targeted ads or promotions	• Sales forecast and demand planning • Inventory and parts optimization • Logistics route optimization • Warehouse and material handling • Procurement and spending	• Product development cycle • Product feature optimization • R&D project prioritization • Design reuse rates • Design production quality

aws

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Solution overview: Industrial data platform

Act

- Product and asset optimization
- Quality management
- Worker safety and productivity
- Smart products and machines
- Supply chain management
- Engineering and design

Analyze

- Data warehousing
- Big data processing
- Interactive query
- Real-time analytics
- Predictive analytics

Store

- Infrastructure
- Security and management
- Data catalog and ETL
- Third-party data

Collect

- Industrial machine connectivity
- Machine-to-cloud framework
- AWS Glue marketplace

Operational data | Historians | SCADA | MES | PLM | ERP | MRO | Logistics

aws

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Collect real-time and historical data from structured and unstructured sources



- Adapters to existing SCADA, MES, LIMS, and historians/protocol conversion to OPC-UA
- Modernize existing field automation hardware (sensors and PLCs) with intelligent gateways
- Add video data (stationary and drone) for quality, inventory, safety, and regulatory inspections
- Full device management capabilities
- Certified hardware: AWS Partner Device Catalog

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Provide a single repository for all operational data

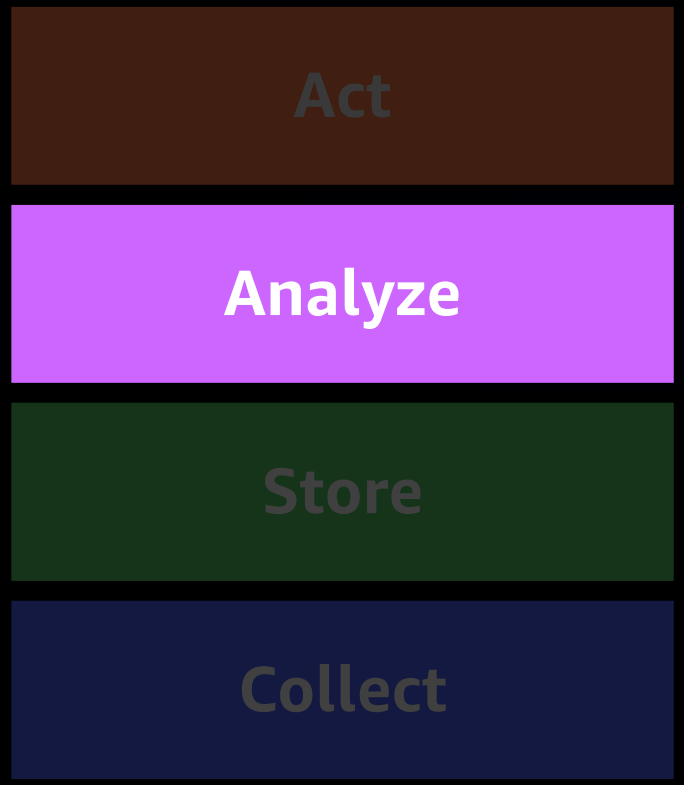


- Fast, scalable storage for variety of data formats
- Elastic and highly durable (11 9’s) storage with intelligent-tiering to minimize storage costs
- Crawlers automatically discover, classify, and build a data catalog and asset hierarchy
- Data lineage helps business users understand data provenance
- Centrally define security, governance, and auditing policies in one place

aws

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Fully managed analytics and ML services

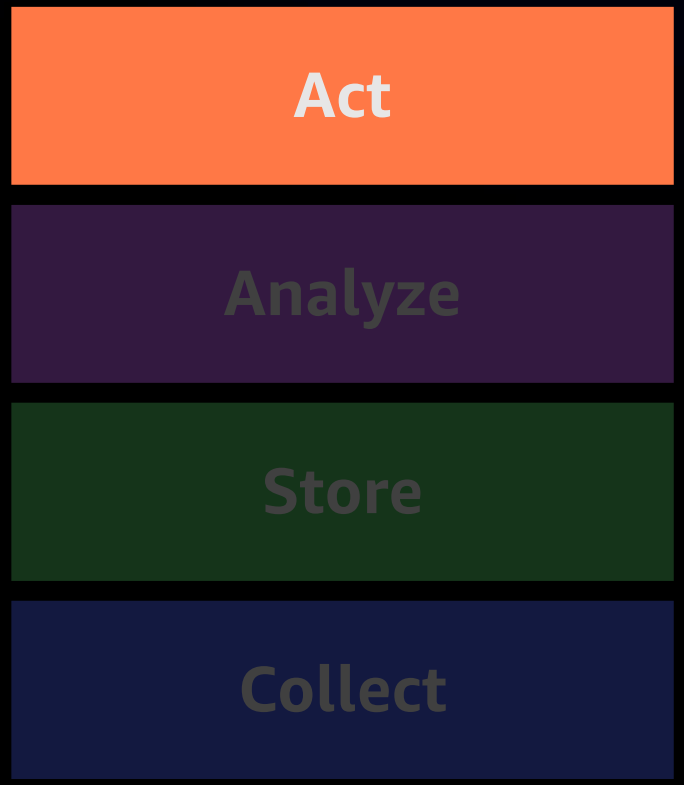


- Quickly visualize data with Amazon QuickSight dashboards and reports
- Integration with other business intelligence tools like Tableau Software, Microsoft Power BI, etc.
- Integrated ML models for anomaly detection and forecasting
- Enable mobile notifications and work instructions with Amazon Alexa voice enablement
- Edge ML inference for critical asset optimization and control

aws

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Enabling business users to turn insights into actions



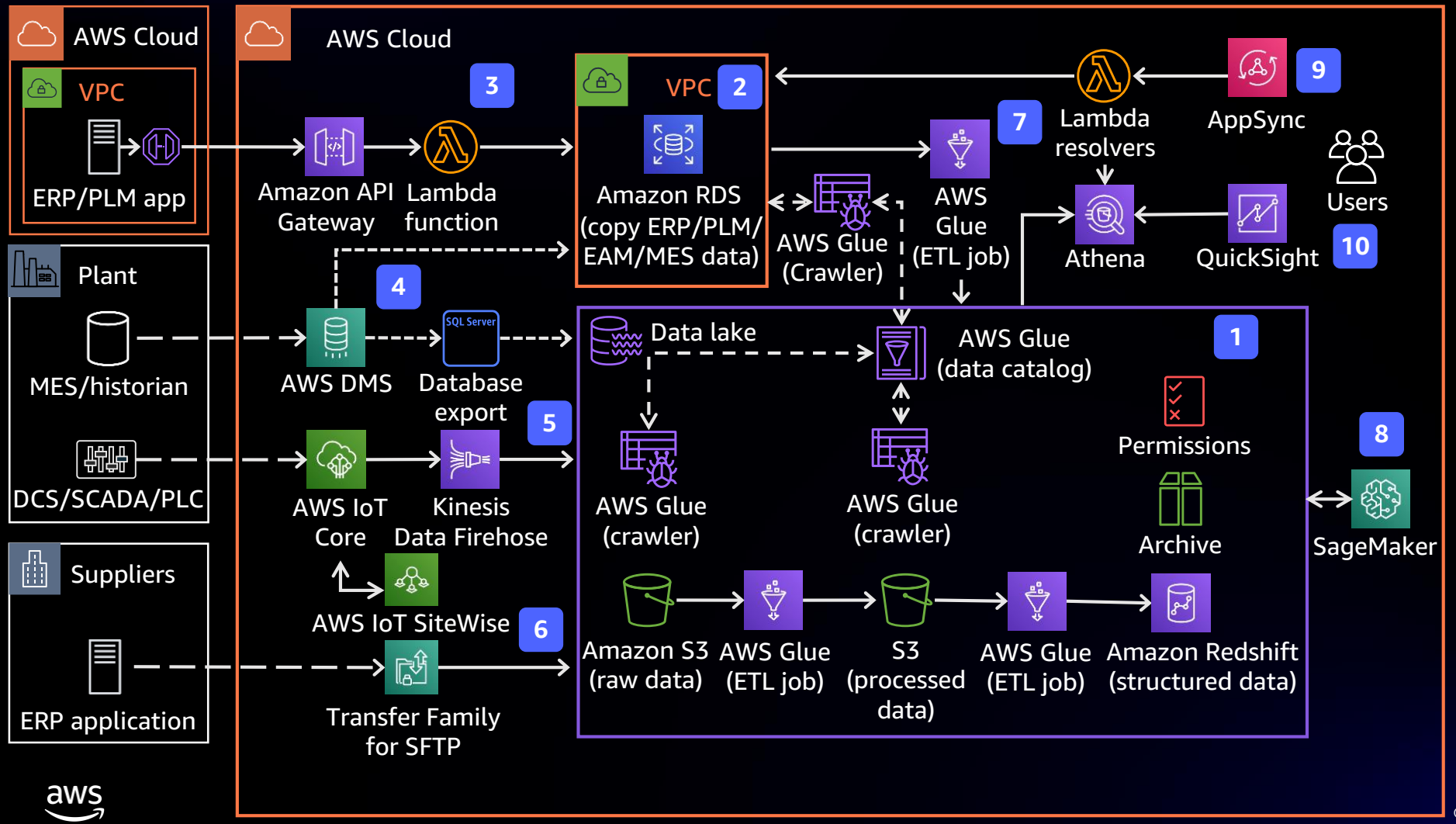
Single data platform to unlock manufacturing use cases to drive business outcomes:

- Optimize production and asset performance with actionable OEE insights
- Improve throughput yield with inline computer vision quality management
- Drive workforce productivity with mobile-enabled, digitized workflows
- Streamline production scheduling, inventory control, and WIP management with supply chain visibility

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Industrial data platform

Build an industrial data lake that includes operational technology data (Industrial Internet of Things [IIoT] and plant applications) with enterprise application data for analytical use cases and predictions with ML models



1. Create a data lake structure using **AWS Lake Formation** or **Amazon S3** and **Amazon Redshift**
2. For structured relational data, create an **Amazon RDS** instance within a VPC
3. For compatible enterprise applications, use **Amazon API Gateway** and **AWS Lambda** functions to create an interface into the RDS instance
4. For compatible databases, use **AWS Database Migration Service** to create copies or export structured data sets
5. For industrial IoT (IIoT) and automation equipment, use **AWS IoT Core** and **Amazon Kinesis Data Firehose** to stream data into the data lake
6. For external or batch interfaces, use **AWS Transfer Family for SFTP** to put data into the data lake
7. Once data ingest paths are set up, use **AWS Glue** to build the data catalog and to create the ETL jobs for data processing
8. Use **Amazon SageMaker** to train and deploy ML models from the data sets
9. Use **AWS AppSync** to build a GraphQL endpoint with **Lambda** resolvers to provide an application interface to the data
10. Build visualizations and dashboards using **Amazon QuickSight** with **Amazon Athena** and **Amazon Redshift**

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Interactive session

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Thank you!

Nishant Saini
sainnis@amazon.com

Adam Frowein
afrowein@amazon.com

© 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.