Modernizing Life Science Manufacturing Using AWS Services

Manufacturing is one of the most challenging environments for Life Science organizations to operate in as they must quickly, efficiently, and consistently execute complex and expensive processes while complying with evolving regulations.

In light of these pressures and opportunities, forward-thinking companies are using technology, data analytics, and Amazon Web Services (AWS) to modernize their manufacturing operations. AWS has established itself as the backbone of such initiatives on the strength of its flexible, scalable capacity, regulatory compliance, IoT, and analytics services. Manufacturers can adopt AWS secure in the knowledge that it can be used in a manner compliant with the good practices (GxPs) that define their operations.

To streamline and accelerate the development of your modernized manufacturing platform, AWS provides the following reference architecture, and details the use of example AWS services through various phases. The reference architecture describes specific phases for:

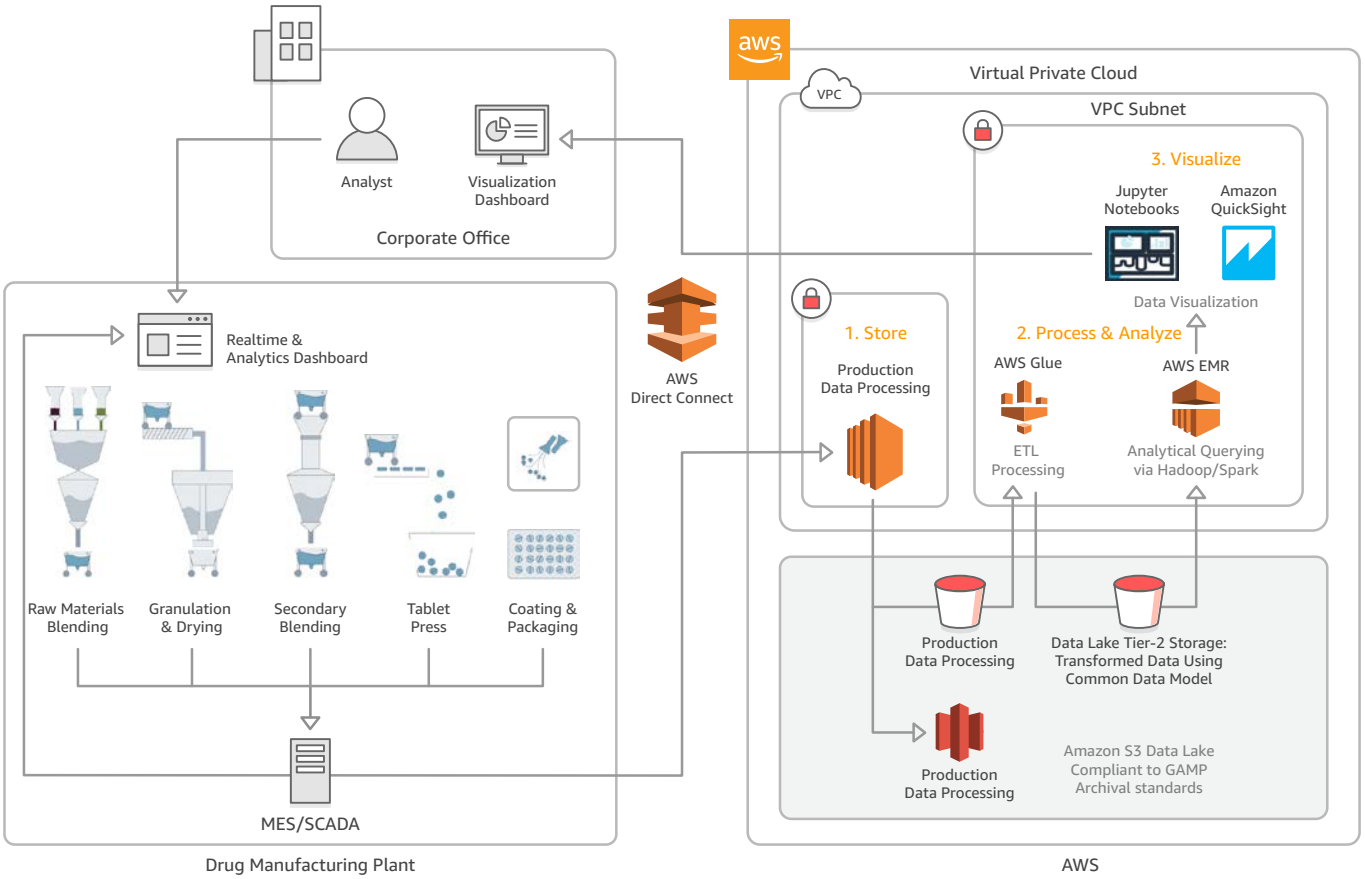
- Establishing a cloud data lake and analytics environment
- Implementing Predictive Analysis
- Real-time Inference with AWS Greengrass & AWS Lambda

For more information on Modernizing Life Science Manufacturing and other ways AWS can help your organization, visit us at:
https://aws.amazon.com/health/biotech-pharma/

Modernizing Life Science Manufacturing Using AWS Services

Establish a Cloud Data Lake and Analytics Environment

The first part of this reference architecture involves three steps, including store, process and analyze, and visualize



1: Store

Production data from control systems and 3rd party historians (e.g. OSIsoft PI) can be sent to AWS via a dedicated private network connection called AWS Direct Connect and run on Amazon EC2.

Historic device data can be saved to Amazon Simple Storage Service (Amazon S3) for raw storage preparation for follow-on analysis or archived to Amazon Glacier.

2: Process and Analyze

Connect historical plant device data hosted on Amazon S3 to AWS Glue for Extract, Transform, Load (ETL) operations that apply a Common Data Model (CDM) in preparation for follow-on whole floor production analytics.

This data can be ingested into a database on AWS or stored as files on Amazon S3 to be used by supported analytics environments like Amazon EMR, Amazon Redshift Spectrum, or Amazon Athena.

3: Visualize

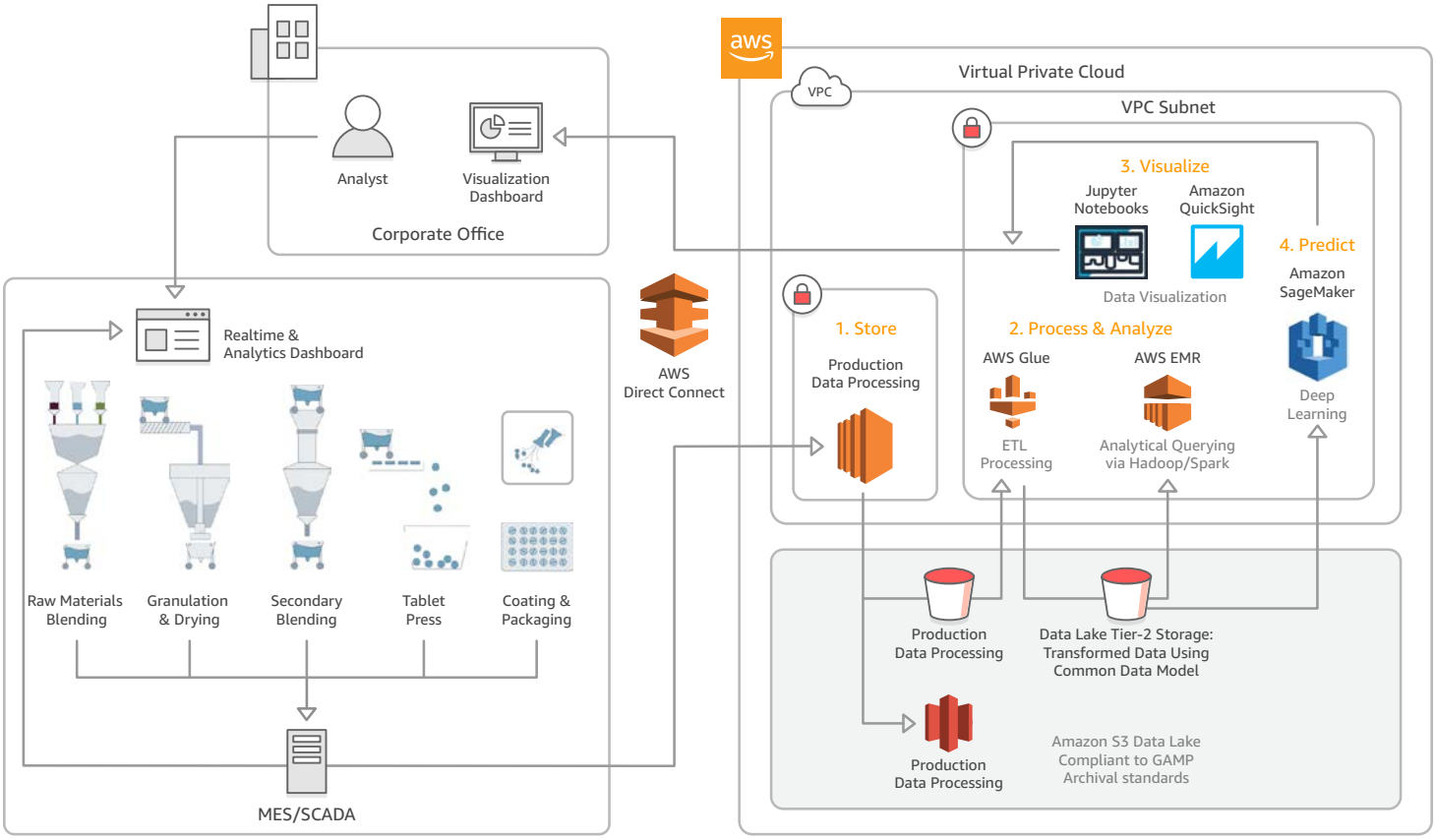
Visualization tools like Amazon QuickSight and Jupyter Notebooks can connect to analytics environments and be supported by ERP dashboards that provide manufacturing stakeholders the information they need to optimize their full-scale plant floor operations.

For more information on Modernizing Life Science Manufacturing and other ways AWS can help your organization, visit us at:
https://aws.amazon.com/health/biotech-pharma/

Modernizing Life Science Manufacturing Using AWS Services

Predictive Analysis

This approach builds on the capabilities of the prior phase, and introduces new steps focusing on prediction and detection, as well as insights and predictive alerts.



1: Store

Via process control and analysis software running on Amazon EC2, production data can be saved to Amazon S3 for raw storage preparation for follow-on analysis or archived to Amazon Glacier.

2: Process and Analyze

Connect historical plant device data hosted on Amazon S3 to AWS Glue for ETL operations that apply a CDM in preparation for follow-on whole floor device analytics.

This data can be ingested into a database on AWS or stored as files on Amazon S3 to be used by supported analytics environments like Amazon EMR, Amazon Redshift Spectrum, or Amazon Athena.

3: Visualize

Visualization tools like Amazon QuickSight and Jupyter Notebooks can connect to Analytics environments and be supported by ERP dashboards that provide Pharma Manufacturing stakeholders the information they need to optimize their full-scale plant floor pipeline.

4: Predict

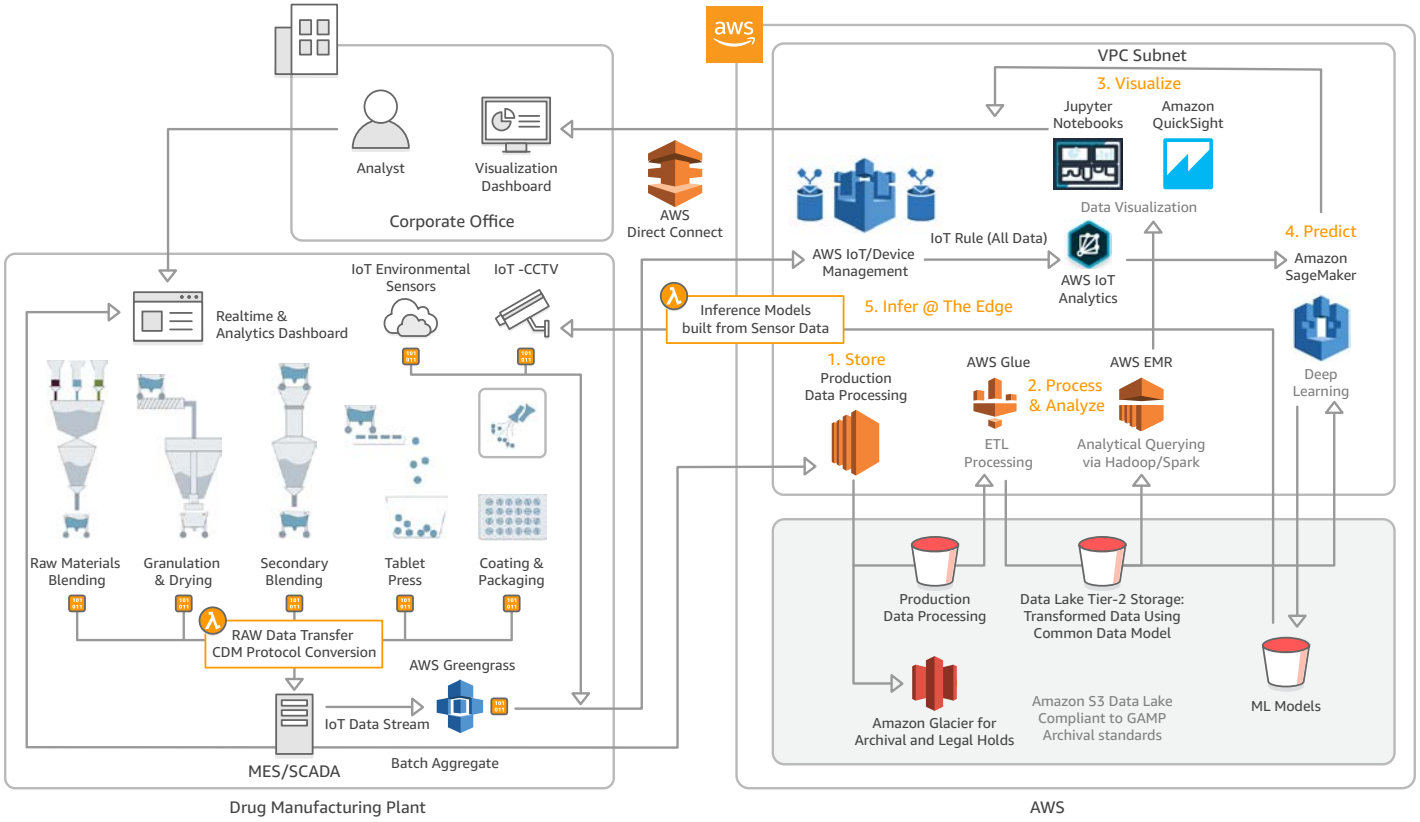
Predictions using AI/ML models via Amazon SageMaker on device data that is historical or streaming.

For more information on Modernizing Life Science Manufacturing and other ways AWS can help your organization, visit us at:
https://aws.amazon.com/health/biotech-pharma/

Modernizing Life Science Manufacturing Using AWS Services

Real-time Inference with AWS Greengrass & AWS Lambda

The last reference architecture phase comprehensively details the end-to-end steps, from store, process and analyze, visualize, predict and inference at the edge.



1: Store

Production data from control systems and 3rd party historians (e.g. OSIsoft PI) can be sent to AWS and run on Amazon EC2. Historic device data can be saved to Amazon S3 for raw storage preparation for follow-on analysis or archived to Amazon Glacier.

2: Process and Analyze

Connect historical plant device data hosted on Amazon S3 to AWS Glue for ETL operations that apply a CDM in preparation for follow-on whole floor device analytics. This data can be ingested into a database on AWS or stored as files on Amazon S3 to be used by S3 supported analytics environments like Amazon EMR, Amazon Redshift Spectrum, or Amazon Athena.

3: Visualize

Visualization tools like Amazon QuickSight and Jupyter Notebooks can connect to analytics environments and be supported by ERP dashboards to provide Pharma Manufacturing stakeholders the information they need to optimize their full-scale plant floor operations.

4: Predict

Predictions using AI/ML models via Amazon SageMaker on device data that is historical or streaming.

5: Inference at the Edge

Machine learning inference models created from historical plant sensor data can detect anomalies in live sensor data at the edge with AWS Greengrass and local AWS Lambda functions and report back to AWS.

For more information on Modernizing Life Science Manufacturing and other ways AWS can help your organization, visit us at:
https://aws.amazon.com/health/biotech-pharma/