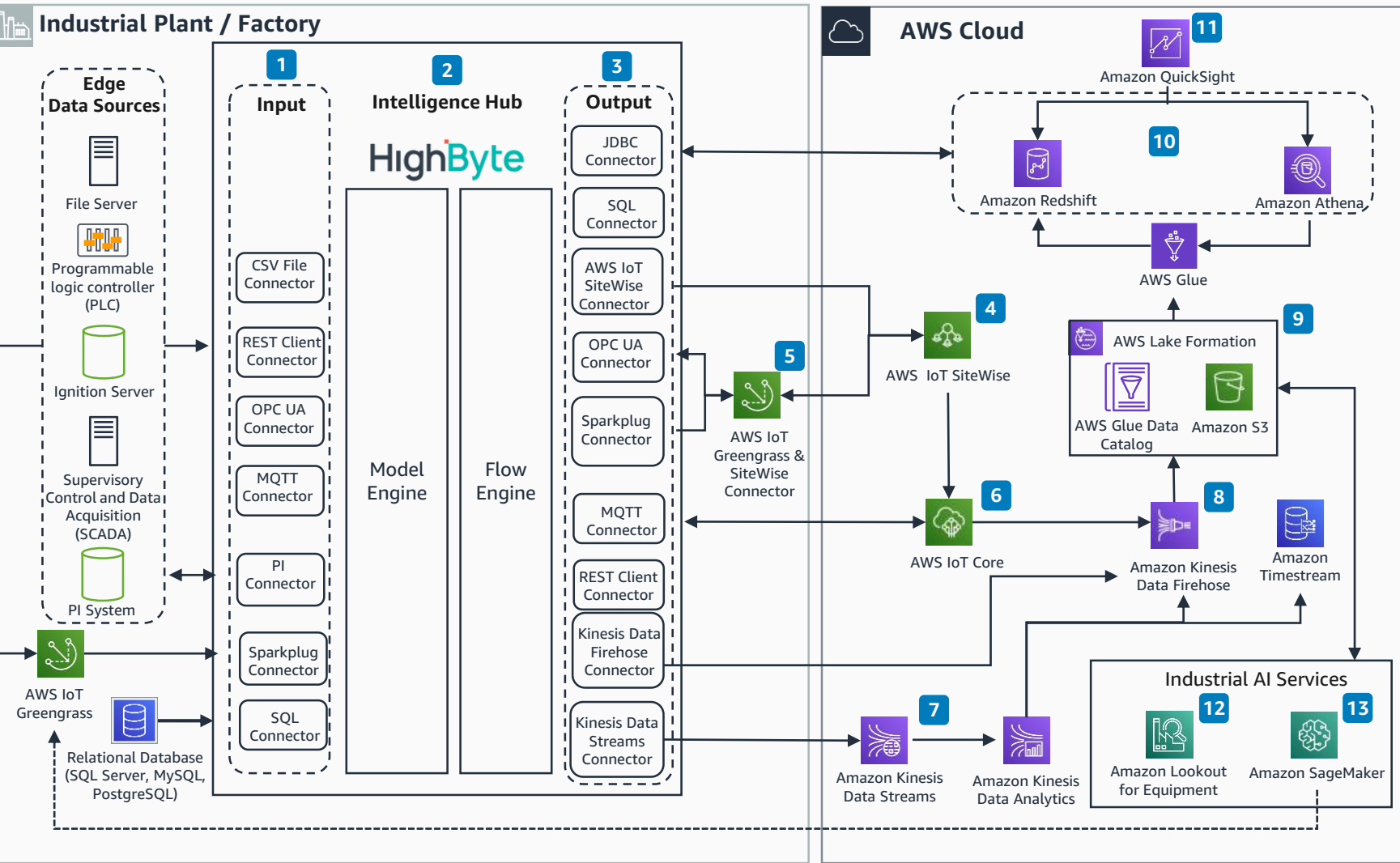


HighByte Intelligence Hub Industrial DataOps on AWS

Integrate Industrial Data with Enterprise Systems in AWS Cloud

HighByte Intelligence Hub (Intelligence Hub) integrates operational technology (OT) with IT by providing a solution to easily and quickly integrate industrial information across multiple systems and enable OT teams to model, transform, and share plant floor data with IT systems.



- 1 Intelligence Hub consumes both real-time and asset model data from a myriad of edge data sources, including relational databases and **AWS IoT Greengrass** via standard industrial protocol input connectors. This includes data ingestion from industrial historians, such as Ignition Server and OSIsoft PI System.
- 2 Intelligence Hub enables customers to standardize, organize, and merge their industrial data into a single equipment model. Then, using *flows*, customers can route the asset models to multiple output connectors, each with a different frequency.
- 3 Intelligence Hub provides a variety of output connectors that support many of standard industrial protocols, including a native **AWS IoT SiteWise** connector.
- 4 Intelligence Hub enables users to build asset models within the HighByte editor and deploy the model directly to **AWS IoT SiteWise** along with the streaming data. This enables users to calculate and visualize metrics from telemetry data using **AWS IoT SiteWise Monitor**.
- 5 Intelligence Hub enables the use of **AWS IoT Greengrass** with the Sparkplug connector. Bi-directional flows can be deployed to allow native communication with **AWS IoT Greengrass** and MQTT brokers and endpoints.
- 6 Intelligence Hub can connect directly to **AWS IoT Core** through its native MQTT service, or use **AWS IoT Greengrass** locally. Intelligence Hub also enables bi-directional communication with **AWS IoT Core** and **AWS IoT Greengrass**.
- 7 Intelligence Hub can connect directly to **Amazon Kinesis Data Streams** for massively scalable and durable real-time data streaming. Streaming data can be transformed and analyzed in real-time using **Amazon Kinesis Data Analytics**, and sent to **Amazon TimeStream** from **Amazon Kinesis Data Analytics**.
- 8 Telemetry data is published in near real-time to **Amazon Kinesis Data Firehose** by either an **AWS IoT Core** rule, **Amazon Kinesis Data Streams**, or HighByte Kinesis Data Firehose connector. This loads the streaming data reliably into an Amazon Simple Storage Service (**Amazon S3**) data lake.
- 9 **AWS Lake Formation** helps users collect and catalog data from databases and object storage, move the data into **Amazon S3**, and clean and classify data using machine learning algorithms. Data is accessed through a centralized **AWS Glue Data Catalog**.
- 10 Use **Amazon Redshift** to store structured data sets and analytics results in a data warehouse. Data into **Amazon Redshift** can be ingested either through **AWS Glue** from **Amazon S3** or directly through the Intelligence Hub JDBC connector using the **Amazon Redshift JDBC Driver**. **Amazon Athena** can also be used to query Amazon S3 through the Intelligence Hub JDBC connector using the **Amazon Athena JDBC Driver**.
- 11 Create business intelligence reports and visualize data from **Amazon Redshift** and **Amazon S3** with **Amazon QuickSight** and **Amazon Athena**.
- 12 When real-time and historical data is available in an **Amazon S3**, **Amazon Lookout for Equipment** uses the data to detect abnormal equipment behavior, so that potential machine failures are detected before failures occur and unplanned downtime is avoided. Computed metrics can be written back into **Amazon S3** for storage and consumption.
- 13 Train and develop machine learning models with **Amazon SageMaker**, and deploy models to run on **AWS IoT Greengrass** to simplify deployment to fleets of edge devices.