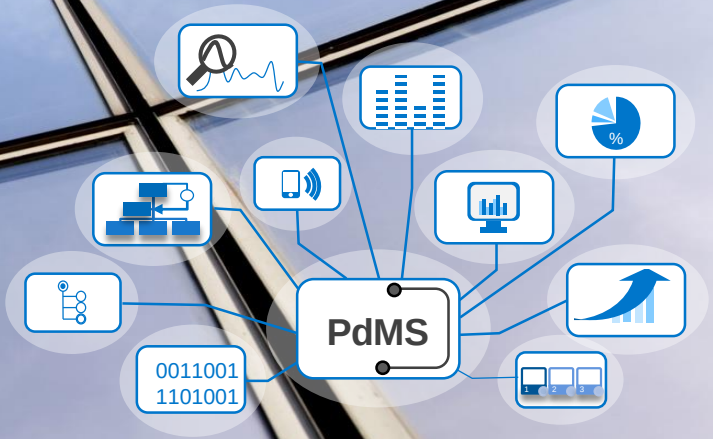
SAP Predictive Maintenance and Service On-Premise Edition

Technical Architecture



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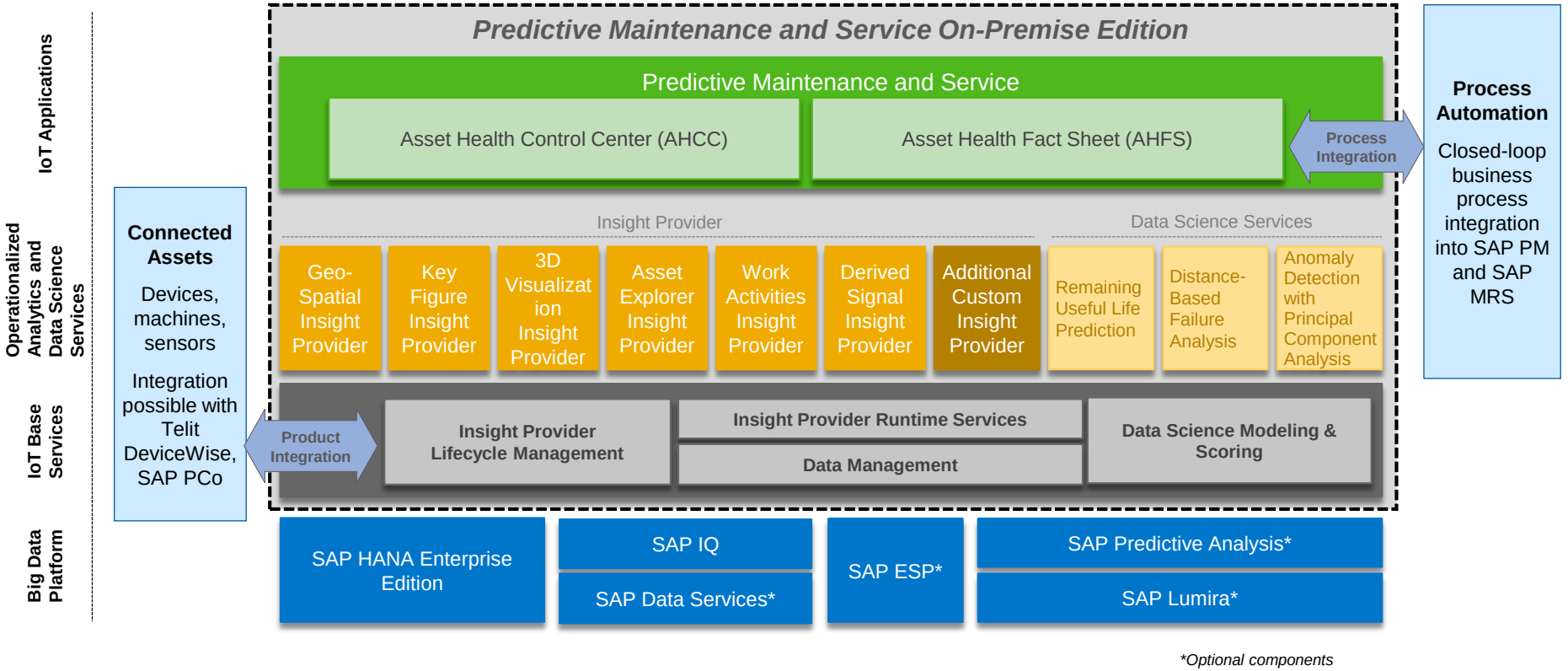
Business Applications built on Modular Analytics



*Optional components

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The Lambda Architecture builds the basis of the PdMS On-Premise Edition to handle the massive amount of data efficiently

Speed Layer

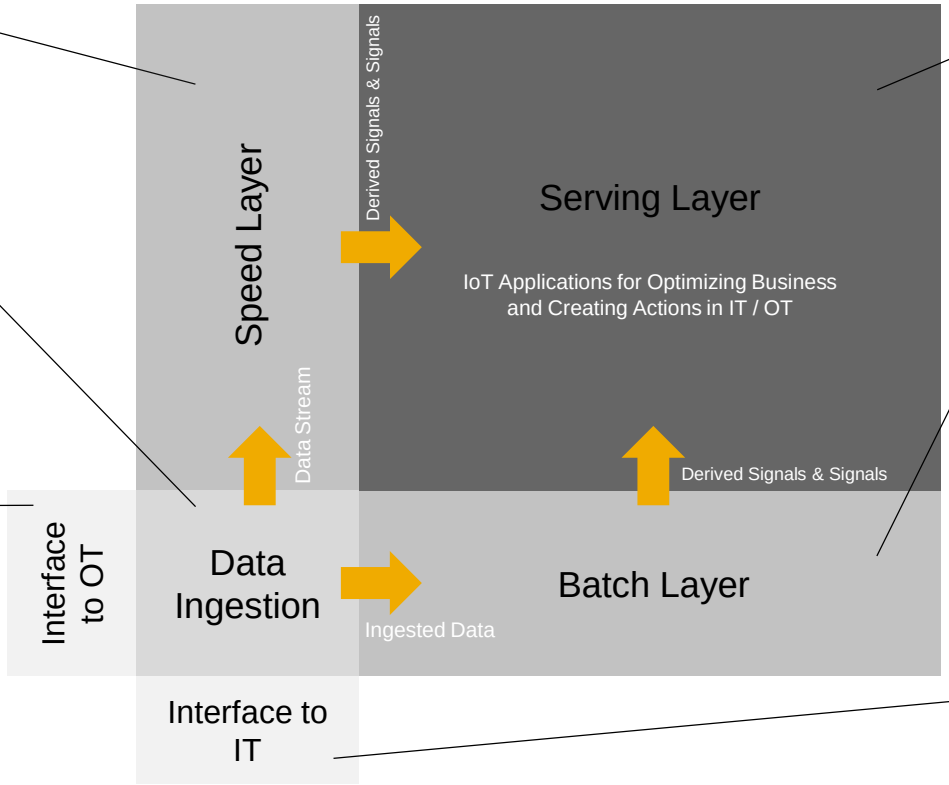
- Scalable consumptions of high speed and parallel data streams.
- In-Stream Processing and Event Stream Processing with support for advanced algorithms.

Data Ingestion

- Scalable messaging system for the reliable distribution of batch, burst and streaming data.
- Data parsing and data cleaning tools including code deployment, scheduling and lifecycle management.
- Data archiving (for audit and recovery)

Interface to OT

- Device on-boarding and ensuring reliable and secure communication.
- Network provisioning including global operations for multiple medium types, e.g. satellite, cellular, fixed line, HV-PLC.
- Device configuration including sensor configuration for data capture.
- Gateway support and logic push-down.



Serving Layer

- Business representation of assets, e.g. hierarchical view with support for fine grained role based access.
- Extensible environment supporting the dynamic inclusion of new sources of insights (derived signals).
- Low response times and scalable for large numbers of concurrent users.

Batch Layer

- Big Data Storage (Volume, Velocity, Variety and Veracity).
- Data Fusion Modeler and Data Exploration.
- Data Mining tools and Model Management.
- Measurement and Verification.

Interface to IT

- Bulk and delta loading of data SAP and non-SAP IT systems.
- Loading data from other systems such as laboratories and imaging systems.

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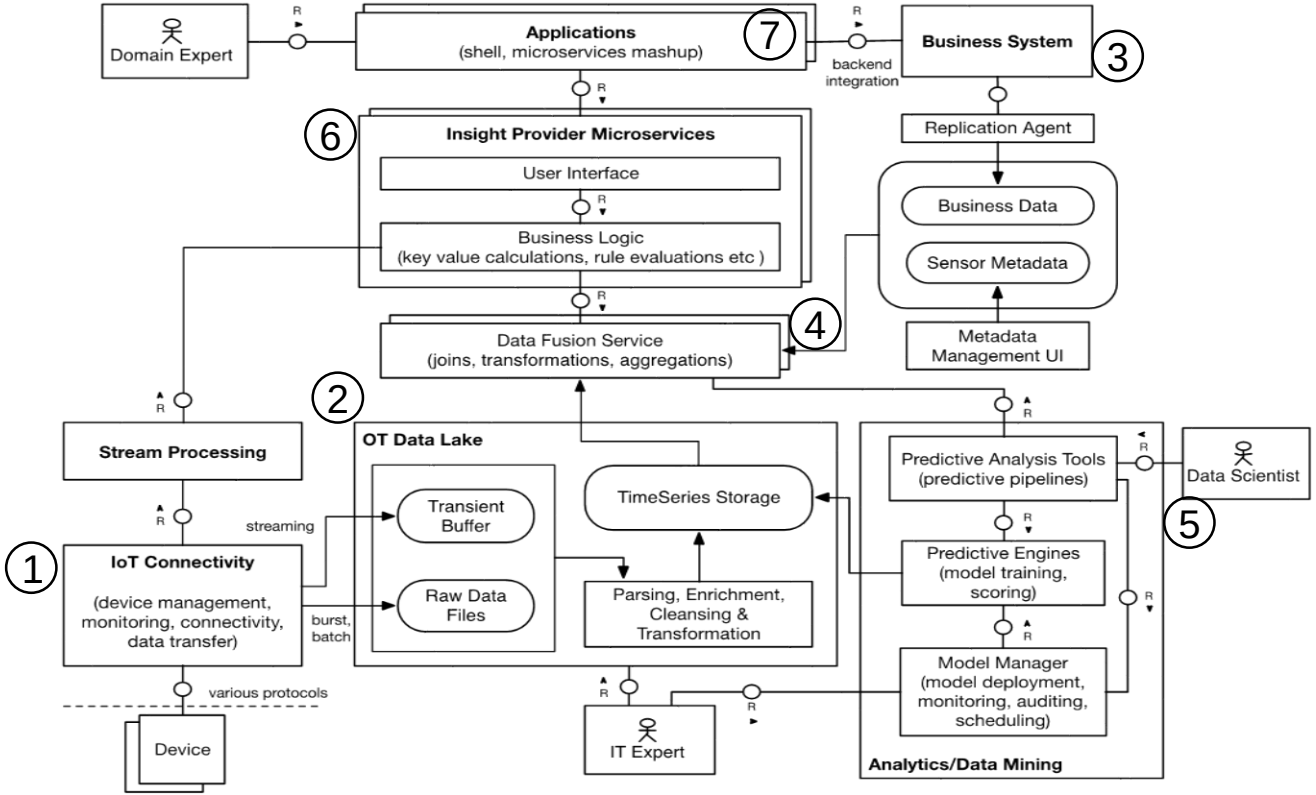
The PdMS On-Premise Edition system architecture consists of 7 building blocks



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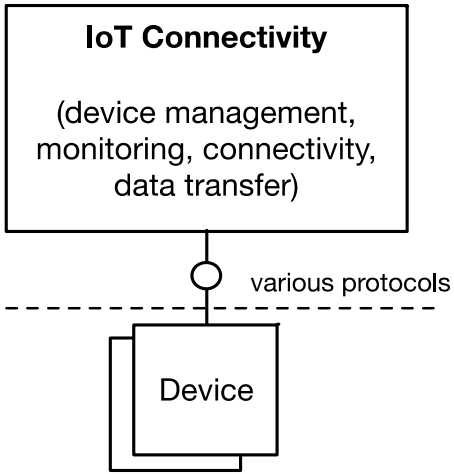
1. IoT Connectivity



Transfer data from the devices using various protocols to the central storage

Offers the network connectivity, device management and monitoring capabilities

Supported transmission types

- Batch
- Burst
- Stream

Reseller partnership with ILS Telit DeviceWISE platform. Integration of OSI PI and SAP's PCo is also possible.

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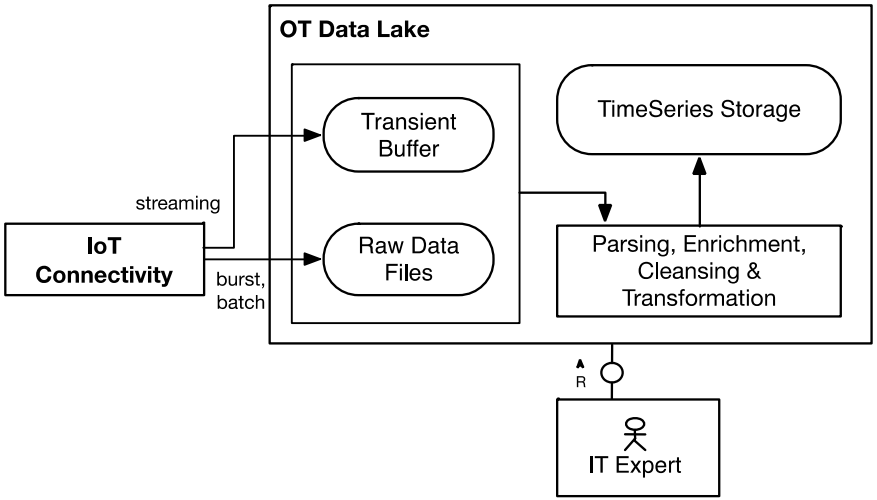
2. OT Data Management (based on Lambda Architecture Pattern)



SAP IQ provides a cost-effective storage for time-series data that scales up to Petabytes

SAP Data Services with custom adapters is used for implementing the parsing, enrichment, cleansing and transformation steps

After the processing is done the raw files are moved to low-cost archive

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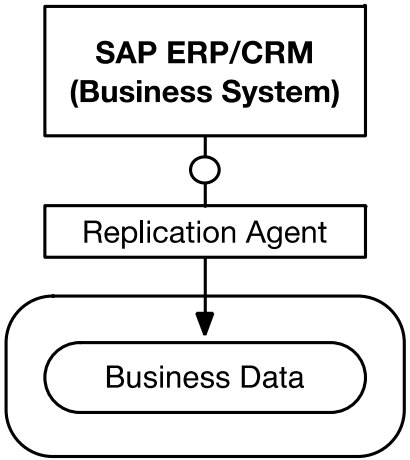
3. IT Data Management



IT data is replicated from a business system including SAP ERP/CRM as well as non-SAP systems

Template IT data model can be customized and extended by the customer

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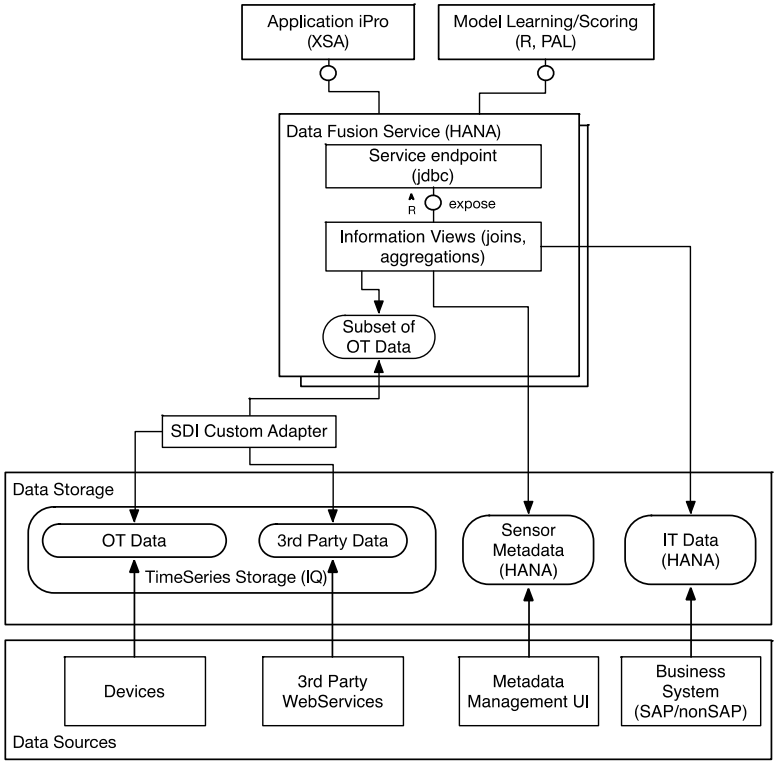
4. Data Fusion



Data Fusion services combines the various source data formats (metric data, metric metadata and business data)

It applies necessary transformations (joins, aggregations) to produce a fused dataset

The fused dataset can be used within an Insight Provider or for Data mining purposes.

As the OT data is semi-structured and IT data model is not fixed, the Data Fusion service implementation will be part of the implementation project

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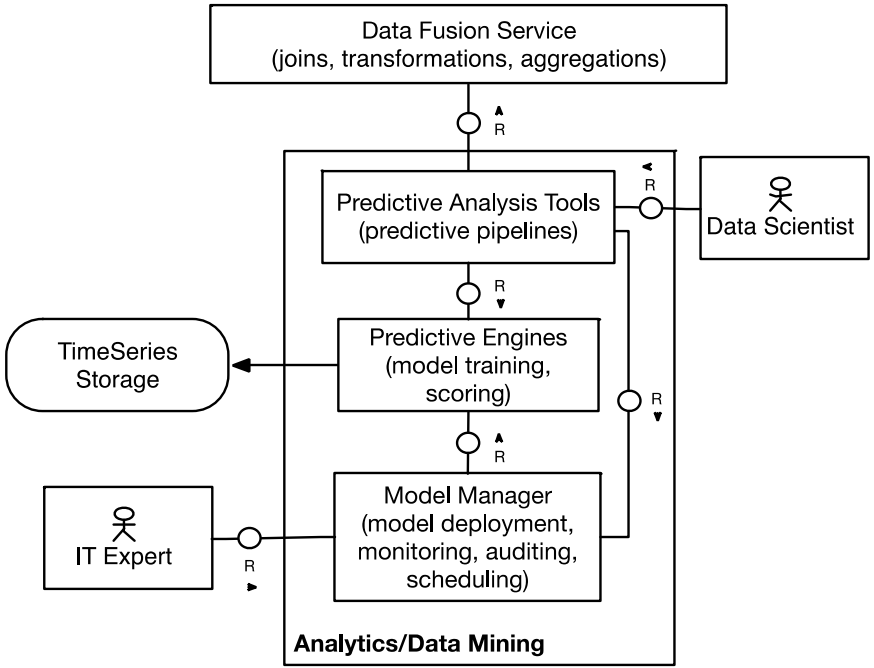
5. Data Science



The analytical data set created by the Data Fusion service is used by the Data Scientists to perform feature extraction and model learning.

The feature extraction and model learning can be triggered from tools on the underlying Predictive engines like R or PAL and the validated models are deployed into the Model manager.

The models are scored against the incoming data and the generated scores/insights are stored in the TimeSeries storage

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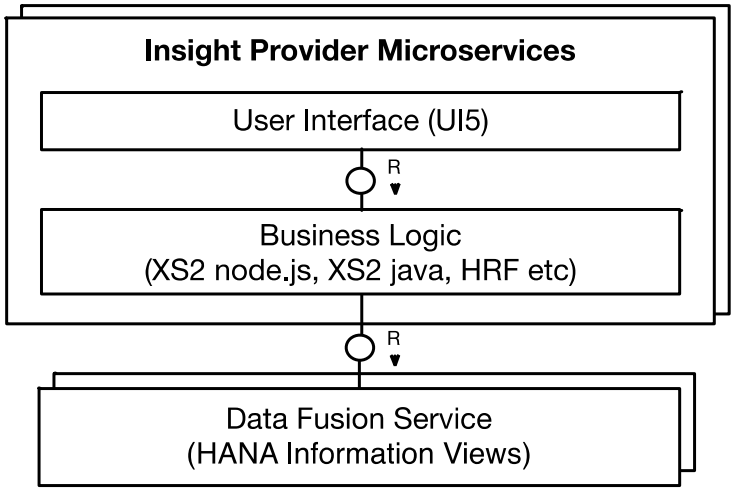
6. Insight Providers



- Insight Providers are micro-services that provide pieces of the analytical functionalities, which are consumed by applications
- Insight Providers consume the data fusion services and implement the business logic to expose the Insights
- Customer can productize their domain knowledge as custom Insight Providers to implement their competitive edge
- Insight Provider will be implemented based on XSA and HANA

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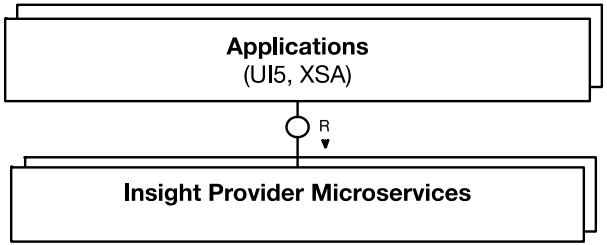
7. Applications



Applications are the user interaction shell for Insight providers

Customers or partners can develop custom applications and custom insight providers on top of PdMS On-Premise Edition platform

Standard and custom insight providers can be part of the standard or custom application

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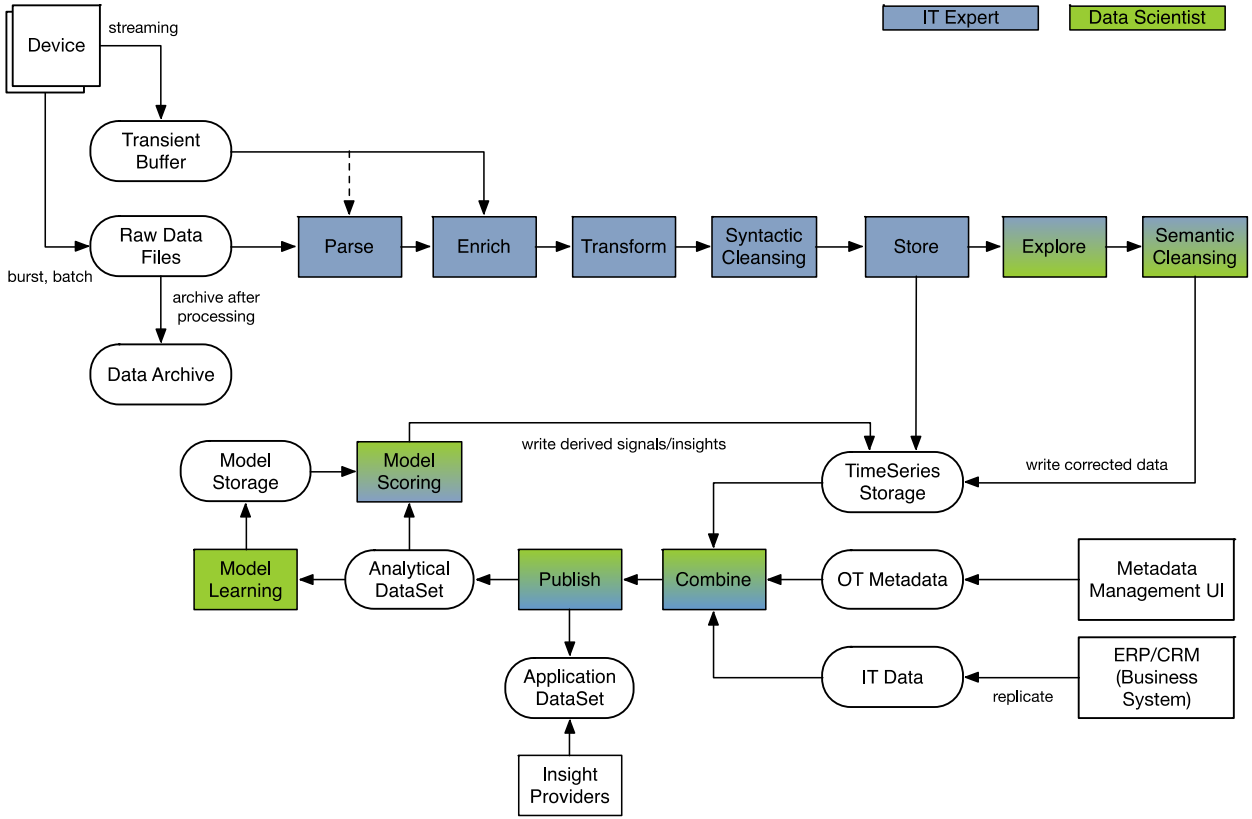
The Data Flow



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