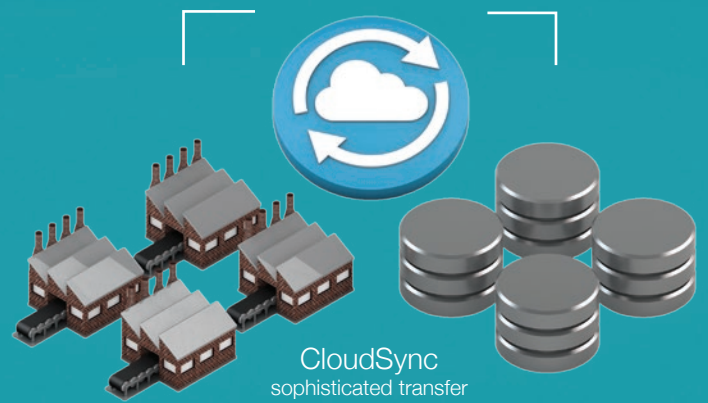




Three decades ago contemporary plant historians were introduced – to capture small packets of volatile data and deposit them on a disk drive as fast as possible while minimizing costly storage space. While computer systems are much faster, the enterprise needs more: BIG data, massive data retention, rapid data delivery to innumerable users, and diverse applications. Only a fresh design can meet those requirements by fully leveraging processing capabilities of new software and hardware with extraordinarily inexpensive, distributed storage.

Mtell Reservoir – a new caliber historian fully meeting the demands of the enterprise

The Mtell Reservoir leverages the Apache Hadoop and OpenTSDB (time-series database) software technology. The Apache Hadoop software library allows for load-sharing by distributing processing of large data sets across clusters of computers. Hadoop scales from a single server to thousands, each offering local computation and input/output storage.



Sites including fleets of equipment

CloudSync sophisticated transfer

Mtell Reservoir large volume data complex processing



OpenTSDB



Additionally, the OpenTSDB is a data management framework designed specifically for handling time-synchronized and indexed data. Implementing

the Mtell Reservoir on signiwith OpenTSBD provides orders of magnitude improvements over traditional plant historians for retrieval and display of very large (BIG) data sets.

*All trademarks are the property of their respective owners.

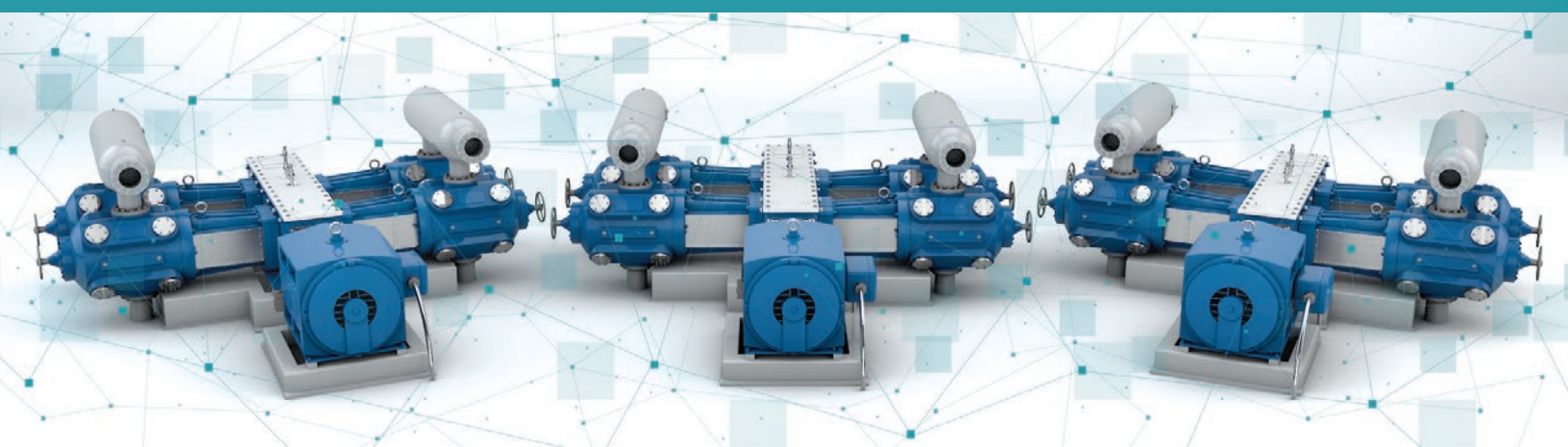
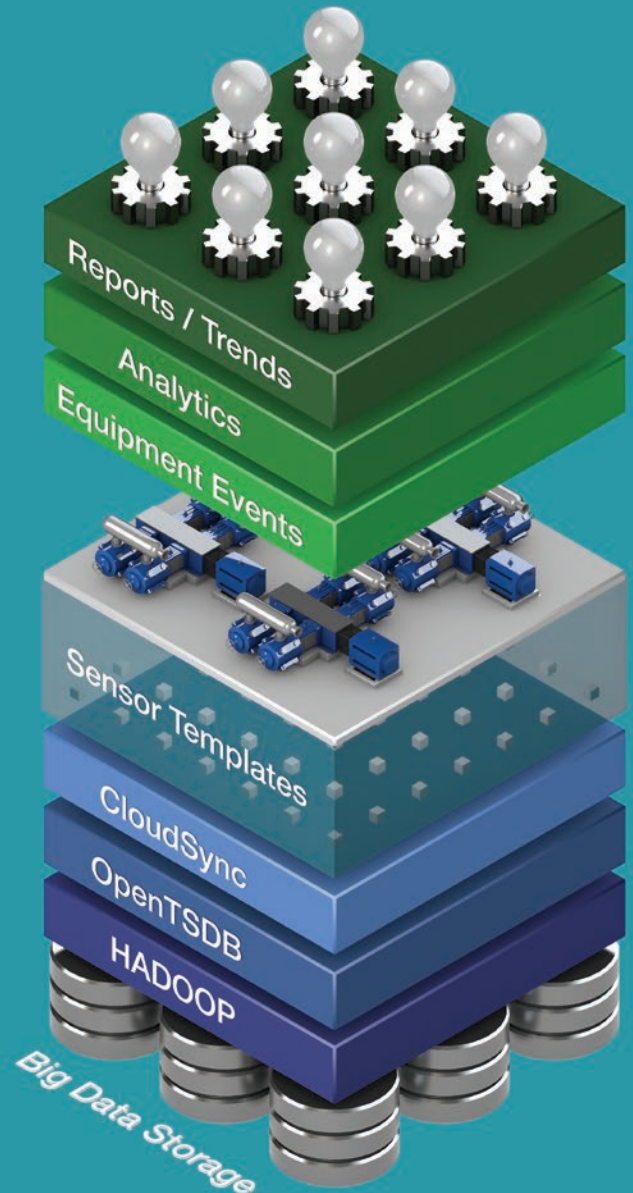
OEM-capable: Mtell™ Reservoir is an ultimate high performance, scalable, general purpose enterprise historian ready for third-party data and client applications

Mtell Reservoir provides significant improvements for retrieval and display of very large (BIG) data sets.

- Storage for all sensor time-series data
- Local and remote data center synchronization
- Handles data and event streams for linking and correlation
- Power to process large datasets
- Foundation for any predictive analytics on time-series data with third-party analysis tools including R, Mathematica, etc.
- Scalability to multi-CPU clusters for:
 - Increase data processing requirements
 - Faster disk I/O operations

The Mtell Reservoir enables BIG data – scalable to thousands of sites, millions of assets, with billions of sensors, and trillions of sensor readings. Open API's assure placement of data into Mtell Reservoir from any time series data source. Prepare that data for “collective” analysis.

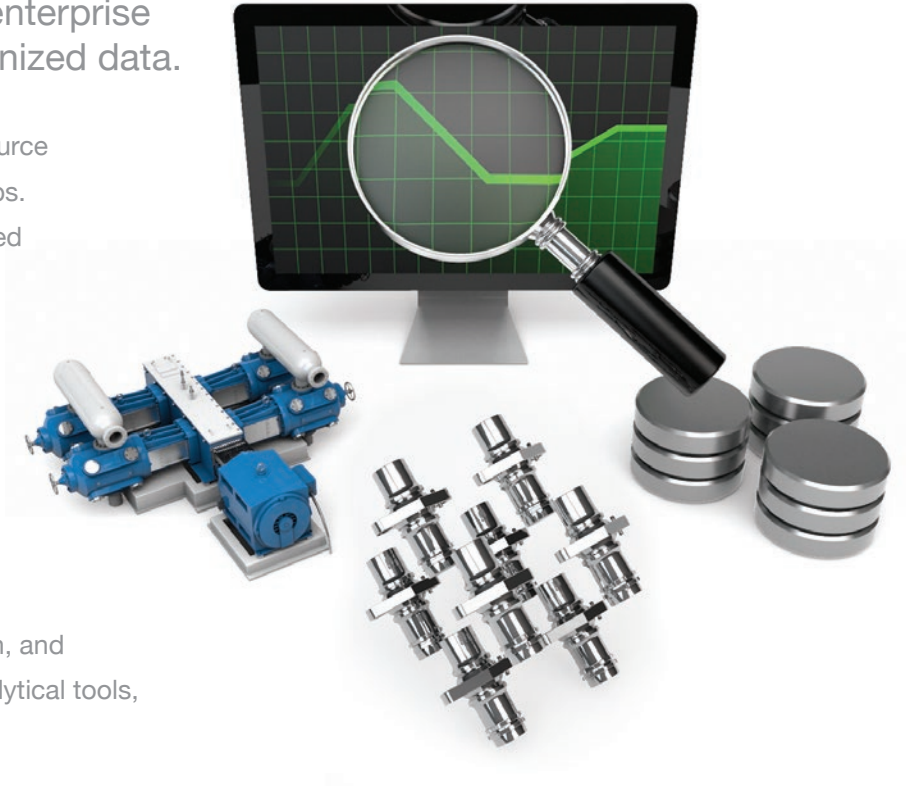
Mtell Reservoir is a key repository enabling the recording of events and trending and analysis of data values that lead up to them.



Mtell™ Reservoir is the full function enterprise storage solution for all time synchronized data.

A BIG data reservoir serves as the storage and source of all related data that is connected by time-stamps. However, management of time-series data gathered into a great big storage requires additional tools.

The Mtell name space and tag name dictionary is critical for unique naming across multiple sites. Maintenance and other event records are available for correlating process activities with specific activities. A built-in application can display multiple sensor signals in time-series trends. Also, Mtell Reservoir allows analysts to perform ad hoc discovery, organization, and enrichment to prepare BIG data sets for other analytical tools, reports, and dashboards.



Mtell Reservoir is the full function enterprise storage for all time synchronized data

Brings extreme performance – a four node cluster ingests 100 million data points per second

Mtell CloudSync

Data loading and ingestion into Mtell Reservoir occurs across multiple sites using third-party tools. Data are ingested in real-time streams, batch uploads, or import of comma-separated (CSV) files. Reservoir intrinsically accepts data from the Mtell CloudSync service attached to distributed Previs systems.

Its elegant and sophisticated bi-directional architecture ensures CloudSync performs stream-based processing across challenging and bandwidth limited network



connections such as satellite links. Transmitted streams include sensor data values, alerts, events, and maintenance activities.

Automatic, lossless data compression means more efficient data transfers, and dynamic throttling keeps transfer within configured bandwidth limits. Signal prioritization assures the most pertinent data are received first, and the system will recover older data as bandwidth becomes available. CloudSync also delivers machine learning signatures from Mtell Summit into monitoring Agents at remote sites.

A Time-synchronized Data Repository for Many Other Uses

The Mtell™ Reservoir is more than an “elevated” plant historian with a bump in CPU speed. First it is “the” scalable high performance industrial BIG data reservoir for time-series sensor data streams and event records. The content of the Mtell Reservoir is not limited to federated views and machine learning for asset health management. Time-series sensor data are “lightly governed” before ingestion; a “cleansing” procedure assure all data points are valid and within range before machine learning. Consequently, the rich content is available for many business users to explore, combine with other data, build reports, and can be extracted and processed by alternative client applications or structured data warehouses to answer questions

that have not been possible or practical in the past. Mtell Reservoir is available for many “horizontal” analytical and reporting tasks that improve both manufacturing process and equipment efficiency including:

- Investigation of trends
- Equipment benchmarking; comparing variances in performance affected by location, usage, etc.
- Batch/discrete process analysis, including comparing behavioral patterns across multiple batches
- Extensive behavioral signature investigation (when used in Mtell Summit)



Mtell Reservoir ... remotely connecting operations and maintenance systems to facilitate highest performing assets at the lowest risk, and best financial performance.

