BUSINESS OVERVIEW

VOLT ACTIVE DATA: PURPOSE-BUILT TO POWER IIOT APPLICATIONS

VOLT ACTIVE DATA

Introduction

Around the world, forward-thinking manufacturing, energy, and industrial product companies are actively connecting their products, equipment, and devices to the Industrial Internet of Things (IIoT). A recent survey found close to half of manufacturers were already adopting IIoT in their manufacturing functions. These companies are also moving aggressively: Nearly 90% said they expect to bring their pilot IIoT projects into full production within one year of purchasing requisite technology.[1]

Succeeding in the IIoT era, however, requires much more than technology acquisition and data connectivity.

This paper explores why IIoT success in the fast-data age boils down to whether your database technology can handle the unprecedented demands of today's technologies, such as 5G. You will also discover the key attributes a modern, IIoT-ready data platform such as Volt Active Data must have to allow your applications to address and take full advantage of the opportunity of IIoT.

1 – Beth Stackpole, Industrial sector amped for digital transformation, MIT Sloan Review.

Our Real-Time, Fast-Data World: New Promises and New Challenges

At the heart of the IIoT revolution are the extraordinary advances in data communications made possible by 5G. The combination of 5G and the explosive growth of the Internet of Things (IoT) is driving a massive increase in real-time data volume, velocity, and variety.

The advent of 5G is already actively disrupting the telecommunications industry and will drive a similarly massive digital transformation for today's global manufacturers.

Meeting the scale, latency, and transactional consistency levels made possible by 5G and IoT is simply not possible with legacy solutions alone. To understand how IIoT-industry players should prepare for this reality, it is helpful to fully understand just what the IIoT actually is.

Here is a useful working definition:[2]

The Industrial Internet of Things (IIoT) is a system consisting of:

- **Networked smart objects**
- **Cyber-physical assets**
- **Cloud/edge computing platforms**
- **Associated information technologies; notably, an IoT-ready data platform**

… which provides critical real-time functionality:

- **Fully accurate data access, collection, and analysis**
- **Monitoring processes through real-time sensor data, providing digital representations of devices, products, and other physical objects ("digital twins")**
- **Exchanging process information within the industrial environment in real time, notably via machine to machine machine-to-machine (M2M) communications**
- **Intelligent, contextual decisioning using predictive analytics, AI, and machine learning**

… to optimize value, including:

- **New revenue (monetization) opportunities**
- **Improved product performance and service delivery**
- **Increased productivity**
- **Lower energy consumption**
- **Process automation**

This definition helps call out the essential capabilities an IIoT-ready data platform *must* provide. Let's explore these key capabilities and how Volt Active Data provides them at a level other solutions cannot match.

2 – The IIoT definition in this paper is based in part on the IIoT framework analysis put forth in the following article: The industrial internet of things (IIoT): An analysis framework, by Hugh Boyes et al, Science Direct.

Key Capabilities of a True IIoT-Ready Data Platform

ULTRA RELIABLE LOW-LATENCY

Industrial organizations are increasingly employing sensors and actuators to monitor production environments in real time. Advanced sensors, for example, give IoT devices greater abilities to monitor key real-time measures such as temperature, pressure, voltage, and motion. Through M2M communications, other IoT devices immediately respond to these measures accordingly by adjusting production or delegating resources.

Successfully capitalizing on real-time data requires minimizing latency to the fullest extent possible.

Volt Active Data has the proven ability to apply complex logic to very high volumes of events in real time, and to use those events to drive concurrent decisions that other IIoT devices and systems need to function, at a fraction of the time of other solutions.

Volt Active Data meets the new demands of 5G/IoT technologies by enabling your applications to go from data ingest to *intelligent decision in under 200 milliseconds—one fifth of a second*.

The Volt Active Data Platform is the only enterprise-grade data platform that can ensure the vital decisioning part happens in *under 10 milliseconds without compromising on data accuracy*.

EDGE COMPUTING FOR "REAL" REAL-TIME DATA PROCESSING

Minimizing latency requires more computing to be done at the edge of the network.

Edge computing, as engineering executive and keynote speaker Dr. Karim Arabi recently explained, operates on "instant data"—real-time data generated by sensors or users.[3] Gartner estimates that 75% of data will be generated and processed at the edge by 2025, up from 10% as recently as 2018.

In today's IIoT world, your edge could be anywhere—even within smart devices themselves — and clearly the edge is moving further closer to users and the connected devices. Indeed, the only way to do things faster and take full advantage of 5G is to utilize the data as quickly as possible by going from ingestion to action right as the data event happens.

The Volt Active Data Platform was designed for the edge. Volt Active Data provides stack simplification that avoids additional technology layers. The less layers you have, the less latency you are introducing to your stack. Volt Active Data's simplified, edge-ready infrastructure is another vital IoT-ready data platform capability that helps enable ingest-to-action in under 200 milliseconds.

3 – Karim Arabi, Trends, Opportunities and Challenges Driving Architecture and Design of Next Generation Mobile Computing and IoT Devices, MIT MTL Seminar Series.

ACID COMPLIANCE FOR DATA ACCURACY, IMMEDIATE CONSISTENCY

As previously noted, IIoT communications are becoming less human-centered and more M2M-centered, which means things are occurring at machine speed, not human speed. But while it's great to have data quickly, this extra speed also means that it's essential to also have it accurately, because you no longer have time to fix things.

Any effort to achieve real-time data availability must go hand-in-hand with data quality efforts. What most NoSQL solutions and others leave out is that immediate data consistency is just as important as database performance.

Having an ACID-compliant database means you know your IIoT data is 100% accurate — no exceptions, no excuses. Without immediate consistency, any real-time application will just do the wrong thing quickly. Relying on an "eventually consistent" or non-ACID database means you cannot be sure you will always make the correct decision.

Volt Active Data combines the ACID transaction guarantees of an RDBMS with the scalable performance of NoSQL for OLTP read-write workloads. As *the* NewSQL data platform designed for today's real-time, fast-data world, Volt Active Data provides the best of both worlds of RDBMS and NoSQL.

INTELLIGENT, REAL-TIME AGGREGATIONS

At the heart of any powerful IIoT application is an ability to make complex decisions using both historical and near-recent records to attain a nuanced understanding of an event and act on it in the best way possible, according to your unique business needs and KPIs.

Most data platforms—especially those using legacy or NoSQL database technology—focus on either historical data or recent data, without aggregating them for a holistic view.

In contrast, Volt Active Data materialized views support real-time aggregation, as well as summary and support combining real-time analytics with per-event decisions.

INTELLIGENT QUEUEING AT SCALE

Real-world IIoT data is complicated, full of exceptions and conditions, and comes extremely fast from widely distributed sensors, devices, and other sources. A true IIoT-ready data platform must be able to process massive multiple streams of real-time data in order to optimize all processes and operations based on ongoing events. Doing so requires making real-time decisions based on complex, conditional logic.

Volt Active Data can manage disparate IIoT devices at a massive scale with precision and high availability to enable intelligent, precise responses to events captured from the message queue. This *intelligent queue* of inbound and outbound messages can also handle security, encryption, authentication, translation, and capacity management, all of which are required for mass-scale IIoT deployments.

ENABLING OF "ACTIVE" DIGITAL TWINS

As mentioned above, a "digital twin" is a digital representation or replica of a physical object's status, driven by real-time data gathered by sensors. For example, an organization can use digital twins to collect and store data about the physical counterparts in an intelligible form so the organization can apply machine learning algorithms to determine what that data is telling them.

However, the traditional method of storing all data and querying it "when necessary" is increasingly insufficient in the fast-data age of 5G and IoT.

Acting intelligently on events in real time requires applying machine learning insights to event streams to make immediate, impactful decisions and drive the most appropriate actions. Doing so requires active digital twins.

Unlike regular digital twins, active digital twins fully participate in business processes by putting the insights and learnings traditionally provided by the digital twins to active use for decision and process automation.

Volt Active Data uniquely enables active digital twins through accurate, low-latency data processing at the point of data ingestion, intelligent data aggregations, and intelligent queuing. With Volt Active Data, digital twins actively apply insights gained from machine learning into your decision-making rules in real time.

Volt Active Data: An IIoT-Proven Data Platform In Action

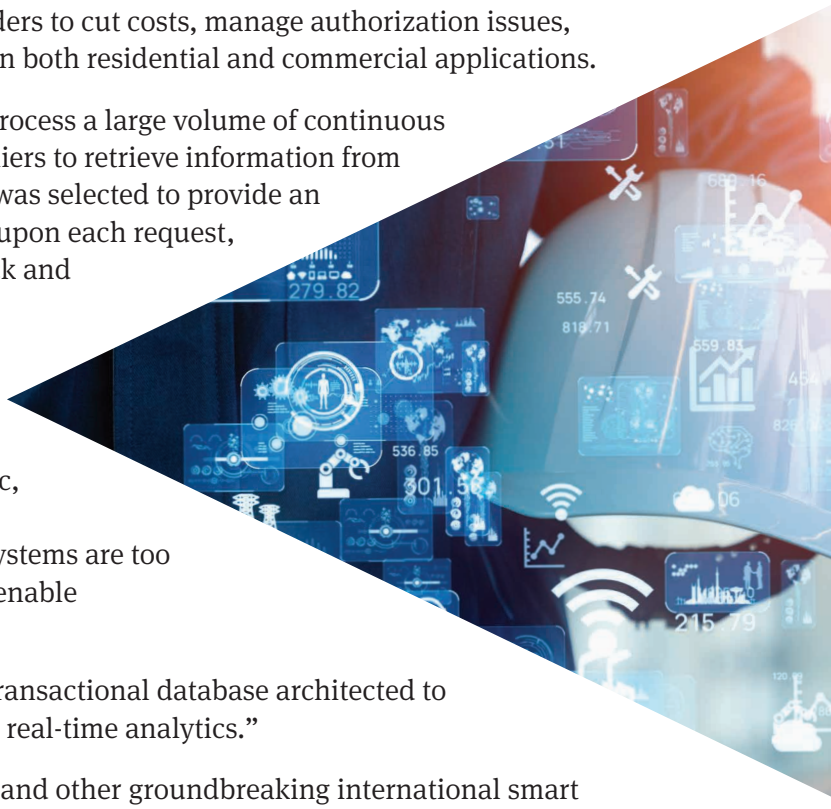
The Volt Active Data Platform has a proven record of success in some of the most complex, demanding, global IIoT environments. For example, Volt Active Data is enabling real-world smart energy deployments in Japan and Europe, as well as partnering with industry leaders to accelerate the adoption of smart energy solutions.

In the Hokkaido and Shikoku provinces of Japan, Volt Active Data is providing a fast-data engine to support smart meter deployments through a partnership with Mitsubishi Electric. Volt Active Data is enabling high-velocity data ingestion, fast-data analytics, and rapid decision-making for more than six million smart meters. Leveraging the speed and real-time analytics of Volt Active Data, the utilities now apply context and intelligence to meter utilization data as it arrives in real time and automatically take action to drive down energy consumption.

Volt Active Data is also part of an upcoming national smart energy deployment in the UK and Europe through a partnership with CGI, one of the world's largest independent information technology and business process services firms.

CGI selected Volt Active Data to power a massive smart metering solution project, which will enable a national network of European electric and gas providers to cut costs, manage authorization issues, monitor compliance, and improve energy efficiency in both residential and commercial applications.

CGI needed a high-throughput database that could process a large volume of continuous messages sent by a national network of energy suppliers to retrieve information from more than 50 million smart meters. Volt Active Data was selected to provide an in-memory platform that delivers fast access to data upon each request, as well as to provide an operational data store to track and monitor information passed through the system.



Commenting on the unique IIoT-ready functionality of Volt Active Data, Hiroyuki Okamura, Manager, New Solution Systems, Information Systems & Network at Mitsubishi Electric, said, "Smart Meters allow utilities to capture energy consumption in real time, but traditional database systems are too slow to ingest metering data, analyze it rapidly, and enable real-time decisions.

"We selected Volt Active Data because we needed a transactional database architected to handle fast data speeds and volume while delivering real-time analytics."

Volt Active Data's years-long involvement with these and other groundbreaking international smart meter projects is reflected in its ongoing advancements as a future-proof IIoT-ready data platform, providing breakthrough functionality universally applicable to the most challenging IIoT use cases of today and tomorrow.

Conclusion

The advent of the IIoT is a once-in-a-lifetime business opportunity—one that requires process automation at 5G scale and speed and the infrastructure to support this automation.

The real challenge—and opportunity—of IIoT is to effectively manage the command, control, and communications mechanisms that allow IIoT devices and sensors to reliably and securely generate new opportunities for increased revenue, lower costs, and better competitive advantage.

Meeting this challenge requires a modern, IIoT-ready data platform capable of intelligent, precise responses to real-time events captured from the message queue in less than 10 milliseconds, along with 100% ACID-compliant data accuracy.

With Volt Active Data, you get the full package, delivered on a unified data platform with a small tech stack footprint, paving the way for quick and easy development and deployment of game-changing IIoT applications.

ABOUT VOLT ACTIVE DATA

Volt Active Data enables enterprise-level companies to innovate faster, perform better, and create new revenue streams by unlocking the full value of their 5G data. The only data platform built for real-time, sub-10 millisecond decisioning, we empower companies to re-engineer their latency-dependent solutions to process more data than ever before at a faster pace than ever before, allowing them to not just survive but thrive in the world of 5G, IoT, and whatever comes next. By combining in-memory data storage with predictable low-latency and other key capabilities, we can power BSS/OSS, customer management, and revenue assurance applications that need to act in single-digit milliseconds to drive revenue or prevent revenue loss, without compromising on data accuracy. For more information, visit voltactivedata.com.