

Bosch Power Tools Drives a Digital Transformation and Smart Tools Innovation by Streaming IoT Data with Confluent Cloud



Headquarters

Germany

Industry

Manufacturing

Challenge

Enable a small team of solution architects to power a large-scale digital transformation with new applications that process and respond to real-time events

Solution

Use Confluent Cloud Enterprise and Apache Kafka® to implement a common, IoT architecture that supports real-time, event-based streaming and persistent event storage.

Results

- Low-maintenance, scalable event-streaming platform established
- Cutting-edge position maintained by small team
- Foundation for digital transformation set

The Bosch Group is a leading global supplier of technology and services with operations divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT company, Bosch offers innovative solutions for smart homes, smart cities, connected mobility, and connected manufacturing. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to deliver innovations for a connected life, and aims to improve quality of life worldwide with products and services that are innovative and spark enthusiasm.

Bosch Power Tools is a division of The Bosch Group. With roughly 20,000 associates in more than 60 countries, Bosch Power Tools is among the world's leading providers of power tools, power tool accessories, and measuring tools. To align with an overall digital transformation initiative at The Bosch Group (called "3S" IoT strategy combining services, sensors, and software), Bosch Power Tools aimed to personalize the user's experience of its products with an IoT solution that leveraged sensor data from smart power tools and a newly redesigned mobile app.

To facilitate and accelerate this and future transformations, Bosch Power Tools (Business Digital Organization (BDO) Digital Offerings) built a common platform leveraging Bosch IoT Hub, Microsoft Azure, and Confluent Cloud Enterprise with Apache Kafka®. As a critical component of the Bosch Power Tools IoT architecture, Confluent Cloud enables asynchronous communication between applications and microservices with real-time, event-based streaming and persistent storage of events. This architecture serves as the common ground that ties together a broad range of development projects and lays the foundation for rapid innovation in the coming months and years. "Confluent Cloud and Kafka are the heart of all our projects, serving as a backend for new mobile apps and for collecting data from assembly lines and legacy systems," says Ralph Debusmann, Solution Architect at Bosch Power Tools BDO Digital Offerings. "From the start, we were interested in not just streaming data once, but also being able to replay it. With Confluent Cloud and Kafka, we have a single source of truth, where we can keep data

indefinitely. More importantly, we can now build new applications on top of our event streams -- as often as we want and as many as we want."

A small team of fewer than a dozen solution architects is responsible for developing the core Bosch Power Tools IoT architecture and managing its implementation and operation. The limited size of this team makes it essential for each architect to focus on meeting business needs and developing solutions, instead of maintaining systems. "Bosch is a large company, but we at BDO Digital Offerings are still a rather small team. With as many projects as we have, we don't have the time to manage Kafka ourselves," says Debusmann. "With Confluent Cloud we have none of the overhead or worries that come with self-managing. We have a guaranteed 99.95% uptime SLA, access to 24x7 expert Kafka support, and access to the latest Kafka developments. By not having to worry about managing clusters, we can spend more time

delivering new capabilities and adding value."

Bosch Power Tools has already deployed several new applications based on the architecture and more projects are planned or underway. By incorporating capabilities from the Confluent KSQL streaming SQL engine, Kafka Streams, and log-based Change-Data-Capture (CDC), and more, these applications will support real-time alerting and new real-time dashboards that merge and present data from manufacturing plants, dealers, tool owners, and other sources across the company. Bosch Power Tools has also built a novel software solution for lean construction site management called RefineMySite which is completely event-based and which makes use of the latest and greatest features of Confluent Cloud like Schema Registry. Very soon, Bosch will receive data from the tools after they are sold. One source will be the repair service reading out device data and another, more important, source will be live field data.

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Business Results

Low-maintenance, scalable event-streaming platform established. "For us, a key advantage of Confluent Cloud is that we don't have to worry about our Kafka cluster or any DevOps issues with it," says Debusmann. "And later on, as we add more and more data to it, we can rely on Confluent to reconfigure the cluster to meet our requirements. We can have data flow in from all our projects, and then keep it, share it, and replay it – all without worrying about infrastructure."

Cutting-edge position maintained by small team. "It's a good feeling to have Confluent, the company that has developed most of the code for a key part of our

infrastructure, behind us," Debusmann says. "We know we are getting all the latest developments with Kafka, and that makes it possible for us to stay on the cutting edge of state-of-the-art software development, even with our fairly small group."

Foundation for digital transformation set. "Confluent Cloud is enabling us to realize our vision," Debusmann says. "As more projects come in and more topics are shared across teams and business units, we will be merging data from sales and marketing with data from production and manufacturing onto a single platform, and opening entirely new opportunities for innovative new products."

Technical Solution

The group of solution architects at Bosch Power Tools worked on a number of pilot projects with the base version of Confluent Cloud before adopting Confluent Cloud Enterprise with 24 x 7 support, unlimited throughput and retention, and the 99.95% uptime service level agreement. After these early projects, the group set up its shared IoT architecture based on Confluent Cloud, Microsoft Azure, and Bosch IoT Hub, a fully managed cloud service that enables devices to securely connect to IoT applications via a variety of protocols.

The new architecture helped jumpstart the development of several new applications, and enabled the team to outsource development to third-party development teams while ensuring all the applications would share the same event streaming platform as common ground. The most advanced and most promising of these applications, RefineMySite, provides a digital platform for construction site management based on agile principles. Collaborative planning and consultation, coordination, and communication are all enabled by a cloud solution powered by real-time event streaming with Confluent Cloud. For example, plan updates are immediately published to all participants on the building site using a combination of Kafka and Server-Side Events.

A second application, Pro360, implements a modern and scalable solution for inventory and asset management and makes heavy use of the latest Kafka features such as KStreams, KTables and Materialized Views. HGApp uses Confluent Cloud to merge Bosch-branded bulletin boards from the Internet together into a handy app and will serve as a starting point for further IoT projects. Bluehound enables workers to track, manage, and locate tools

and other equipment anytime and anywhere from the warehouse to the jobsite.

Other projects aim to combine assembly line and field data using the event streaming architecture by incorporating features such as Confluent KSQL and Kafka Streams for processing and responding to events in real time. Eventually, we aim for an ultra-lightweight "databaseless" and "serverless" architecture for IoT at Bosch Power Tools. Throughout the development and operation of these applications, Bosch Power Tools has relied upon timely support from Confluent to keep projects on track. "Whenever I have an issue, I can call one of the Confluent engineers here in Germany and get an answer," says Debusmann. "Our development teams have also contacted Confluent for support; their issues were resolved and they were happy with the results."

Debusmann notes that Confluent Cloud has provided Bosch Power Tools with a competitive advantage and significant head-start on other companies in their market. "Many companies are still wrangling with their data, moving it into another database or table, and then wrangling it again. The whole idea of keeping up with data in event streams is so new, that some people have yet to come to grips with it," he says. "Kafka has quietly become an essential part of every modern infrastructure, but not all the companies who recognize that have fully thought about the value of expert support from the people who are really developing Kafka. Confluent Cloud and Kafka are already at the heart of our architecture, and soon I expect that realtime event streaming with Kafka will be a key part of the infrastructure for every company that practices modern software development."

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