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How edge analytics helps optimize the costs of IoT initiatives

Collecting and analyzing large amounts of data in the cloud has long been a focus in the IoT. While this approach is certainly valid in some scenarios, it can also be quite risky from a financial perspective. Think about it: you store terabytes of data in a data lake and use highly sophisticated algorithms to gain the information relevant for your business. Before you know it, you are dealing with ever-increasing costs for sending, storing and analyzing all this data, while the insights you gain pale in comparison.

Luckily, there is an approach to making IoT device data projects more cost-efficient: edge analytics. By facilitating data processing at the edge of a network – close to the sensors and devices in the field – you can gain valuable insights, without having to deal with large amounts of data in the cloud.

Key takeaways

- Edge analytics provides a more cost-efficient way of working with IoT data, compared to analyzing large amounts of data in the cloud.
- Since resources at the edge are more constrained, you have to limit yourself in regards to the data you analyze and clearly define the outcome. Thus, this approach can inherently save you money.
- Widespread device data use cases can be tackled with a local edge-based approach.

Cloud vs. edge

Cloud computing has revolutionized how organizations build applications and operate their data centers. It has enabled companies to centrally store massive amounts of data and optimize computational resources to deliver on their data processing needs.

Edge computing, however, facilitates data processing at the edge of a network, close to the data source. It provides companies with a means to implement IoT use cases, where connecting thousands or even millions of devices directly to the cloud is not feasible due to e.g. costs, privacy, and network issues.

The costs of working with device data in IoT projects

Companies that implement IoT solutions will eventually make the experience that working with device data can be surprisingly expensive. The two main cost drivers are:

- **Infrastructure:** Costs for sending and storing large amounts of data can quickly pile up. An additional cost driver is the computing power required to analyze the data.
- **Experts:** You want to draw meaningful conclusions out of the data that provide value to your business. To ensure this, you need highly specialized personnel, e.g. data engineers, data scientists, and business analysts.

Naturally, the amount of effort and consequently the costs increase, the more data you collect, store and analyze.

Edge analytics helps you to keep these costs in check – simply by providing a more focused approach to analyzing data. Since resources at the edge are more constrained, you have to limit yourself in regards to the data you analyze and clearly define what conclusions you want to draw from it. You can compare analyzing data at the edge to using a marker pen: out of all the data that your devices generate, only the important bits of information are filtered out. Running machine-learning algorithms on top of this data then provides you with the insights that you actually need. In other words, edge analytics can prevent you from burning money with a big data approach, where you collect terabytes of data, hire data scientists, run extensive experiments, employ sophisticated algorithms and in the end might not even achieve the outcome you envisioned.

Exemplary use case: tackling typical device problems with edge analytics

Based on the experience of Bosch as a hardware manufacturer, we see that the number of key device data use cases is actually pretty limited. One such use case is tackling typical device and gateway issues with a local edge-based approach – provided, that the data structure and some knowledge about the physics of the respective devices are available.

Devices can cause problems because:

- they are hacked/compromised
- they are overloaded
- they are used in another abnormal way
- they are initially installed in a wrong way

For all of these potential issues, there are indicators in the data that allow you to draw conclusions on the health of a device or gateway. For instance, you can monitor all open connections of a gateway or the load that is put on the CPU. After aggregating this status information at the edge, an algorithm can quickly pinpoint the root cause of a problem and even predict when an issue might occur in the future. Given this knowledge, you can also pre-define measures to solve issues instantly, e.g. by rebooting the device. This minimizes downtime of edge devices that might be mission critical without requiring human interaction and provides greater autonomy, given that a constant connection to the backend is not needed.

When should you choose a big data approach?

Edge analytics reaches its limits, the more contextual information of the complete device fleet or a large subset is needed to draw meaningful conclusions. An example is finding systematic quality issues related to a product. This not only requires expert knowledge about the devices but also a relatively large set of device data that has to be analyzed in the backend.

Creating the intelligent edge

Distributing intelligence to the edge requires enabling IoT devices with local computing, management, messaging and AI capabilities to realize a variety of business models and end-to-end scenarios.

Bosch IoT Edge provides the tools and services needed to connect any device to the cloud, set communication between devices, and develop IoT applications – across different platforms, languages, and system requirements. It allows you to build interoperable solutions, accelerate application development, scale your hardware and applications and manage security and updates.

- **Run on a choice of platforms:** Lightweight native components can be used on small microcontrollers or powerful edge nodes to scale your hardware.
- **Use fit-for-purpose language:** Standard containers allow you to selectively scale applications, reuse code, and access advanced edge functions.
- **Integrate quickly:** Native connectivity and an open MQTT/Ditto protocol allow you to automatically connect devices to the Bosch IoT Suite with minimal customization work.

Contact us to learn more about Bosch IoT Edge.