

Embedded Cloud: close to the factory floor, fast and secure

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In this article, Kontron and its partner S&T introduce their Embedded Cloud concept, a new cloud class designed to advance Industry 4.0 applications.

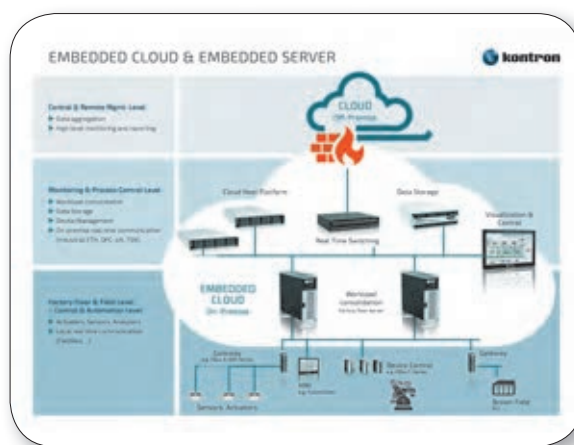


Figure 1. The Embedded Cloud serves as on-premise foundation for the IIoT and Industry 4.0 applications.

■ Kontron's Embedded Cloud is specifically geared towards the Smart Factory directly addressing IIoT needs. The goal is to optimize the production process through real-time analysis of all data available in the company. This requires building a secure cloud that is close to the factory floor, with components that reliably meet industrial needs. Devices that are used in industrial environments have to be extremely robust. They have to withstand the rigors of the factory floor: sudden changes in temperature, constant shocks and gruelling vibrations. Devices that cannot meet these criteria are not able to deliver and process all data produced in an Industry 4.0 context reliably. Absolute reliability, however, is key in the Industrial Internet of Things (IIoT) and in industrial production in general. Manufacturing companies can only keep up with this technological revolution and with their competitors from around the globe if they can confidently rely on all devices linked to the production process.

Collecting data has become commonplace in many company divisions. Data originates from CAD or Product Lifecycle Management (PLM) systems, internal databases Enterprise Resource Planning (ERP) applications, or shop floor devices. A company, however, will not gain much additional value from isolated data. Eliminating data silos and bringing

everything together is the real challenge today, discovering new insights from analyzing the bigger picture of the primary objective. This is the only viable way for companies to realize their full potential in a connected factory environment.

In an ideal scenario, all existing and newly created company data can be connected and analyzed as a whole. The IT systems involved in this have to meet high real-time and security requirements. Transferring data to an external private or even public cloud is usually not feasible and, for security reasons, not always advisable. USPs and cutting edge technology are quickly obsolete once production data, sales forecasts, spec sheets or blue prints fall into wrong hands. This is why on-premise systems involved in production are joined together to form the so-called Embedded Cloud in which IT (Information Technology) and OT (Operational Technology) applications are brought together. An Embedded Cloud as imagined by Kontron comprises three device classes interconnected via network. Industrial computer platforms for device control and gateway functions: these handle measurement and control tasks on-site. For these purposes, they typically use proprietary interfaces to connect to on-site peripheral devices and sensors. These devices are connected to the Embedded Cloud via real-time data communication, e.g.

via Industrial Ethernet. High-performance industrial computer platforms for edge and fog computing: with a typical performance of four to eight CPU cores and a storage capacity of several terabytes (TB), these high-performing platforms handle on-site machine management including imaging systems with various GPGPUs. Embedded Cloud Server: with a typical computing power of more than 16 cores and a storage capacity of more than 100 TB, these cloud storage servers handle machine data coordination for a whole site.

Embedded Cloud is an innovative concept, a new market segment. At the moment, only two types of companies cater to potential customers. Neither, regardless of their origin in either classic IT or automation technology, offers a truly comprehensive and balanced solution. Both supplier types address only parts of the Embedded Cloud, and thus only cover parts of the solution. The practical consequence for OEMs or end customers is a host of partners: one to discuss industrial servers, one for the real-time transfer of production data into the Embedded Cloud, and another one responsible for machine control computers. It is then up to the customer to bring their suppliers together in order to develop a harmonious combination. This is, of course, a very complex and costly endeavour which only rarely produces the desired result.



Figure 2. High-performance industrial computer platform for edge and fog computing

In direct contrast to this, Kontron, together with its partner S&T, covers the full range of Embedded Cloud products and requirements. We offer all components from embedded computers in use on the factory floor to cloud servers running in IT data centres. Why is this important? There is often a lack of communication between corporate divisions. Often-times potential users are confronted with conflicting priorities in IT and OT, with both lacking a clear understanding of their respective counterpart. In such a team, every party naturally focuses on their field while the other remains unfamiliar. Having a vendor and partner who can fully grasp these difficult circumstances and considers both sides and their views can help break the barriers and become a guarantee for success in establishing a sustainable digital production strategy.

Kontron already offers all essential Embedded Cloud components. Some users, however, need an additional fully integrable, scalable, and connectable on-premise solution for their Industry 4.0 projects – the Embedded Server. For practical purposes, this means that the computing

and storage capacity of cloud servers and the robustness of industrial servers will have to be combined. Industrial-ready Embedded Servers are still in the prototype phase at the moment but will be available in the near future.

The graphic shows how IT and OT play together in a Smart Factory environment. It also gives an idea of the complexity of a fully digitalized production process as laid out in Industry 4.0 concepts. All data collected by different devices during the production process are first brought together, then processed and analyzed on-premise. The Embedded Cloud forms the foundation for the Smart Factory and creates an interface where all important information from the production process comes together and is processed for further consideration. Real-time data processing and the comprehensive protection of all data stemming from the connected factory are an important requirement for success in a digitalized industrial environment. The Embedded Cloud is one, if not the most important milestone for the establishment of the Industry 4.0 and IIoT concept for good. ■