Connected industrial asset manufacturer solution

Overview

Companies that in their line of business rely heavily on high value assets and machines, such as packaging machines, CNC machines, industrial printers, and robots, are being pushed to increase profitability and service levels in an increasingly competitive environment. Addressing these business demands requires plug-and-play integration into Industry 4.0, digital transformation, and cloud infrastructures. Through these integrations, they can enhance their own company's profitability, product reliability, service levels and possibly introduce new "asset as a service" business models.

Many of these initiatives include building remote and predictive analytics around equipment use and health. These initiatives require historical and real-time data from sensors, field buses, PLCs, and logs to be seamlessly standardized, cleaned and sent to the cloud. There, the data can be leveraged to generate powerful insights into device's status and create predictive algorithms that help customers optimize uptime, improve scheduling, and reduce costs.

Increasingly, image and video analysis, including AI-based technologies, are being leveraged to optimize plant activities. As these technologies make their way to the industrial floor, there is a growing demand for enhanced compute power. To meet this demand, industrial machines and assets must be equipped with sufficient compute capabilities, which may include hardware acceleration, enabling them to effectively handle these advanced technologies.

With all the envisioned business benefits, the digitalization of edge assets is not without its challenges. Solutions are required that allow the machine manufacturer to extend its value proposition to the market while keeping the requirements at a minimum, especially with regards to the necessary skills to design, deploy, scale, and maintain the IoT solution. Mitigating risk, especially from a security perspective, and ensuring lowest TCO (Total Cost of Ownership) with full remote and lifecycle management are essential to meet the envisioned business benefits.

Opportunity

Industrial manufacturing is undergoing a rapid evolution. With the rapid adoption of Cloud services, advancements in IoT technologies, powerful analytics, and even AI, companies with a business relying on high value assets have an unprecedented opportunity to gain the cutting edge.

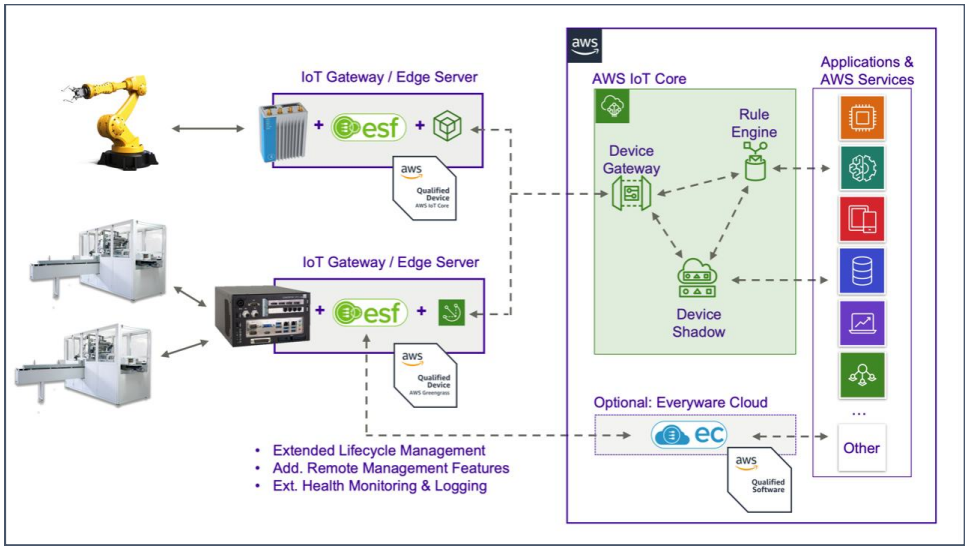
Making data from field assets (devices, PLCs, field busses, sensors, actuators, etc.), readily and easily available on AWS for 56k Cloud customers. While investigating different options, some requirements became very obvious: the need for a Multi-service, Compact and Expandable IoT Edge computing family of integrated hardware & software products (IoT Gateways, IPCs, Edge Servers & Edge AI systems), capable to satisfy the requirements of a variety of customer scenarios. These range from industrial automation to energy & utilities to mobile applications (transportation), while eensuring that also TCO aspects like full lifecycle edge device management and security are addressed.

The largest barrier these manufacturers face is to create a truly future-proof IoT foundation that marries robust security with real-time connectivity and full device management. Once implemented, this foundation will allow manufacturers to develop and launch a myriad of new capabilities and services such as remote asset management, digital twins, predictive maintenance, and edge AI.

One of the most demanding aspects of building a solid digital transformation architecture and implementation is access to know how and skilled staff, supplementing in-house teams with a level of experience typically only found in highly specialized and focused companies offering consulting and

integration services that bring about effective OT/IT integration. Much of this requiring a multi-skill set spanning cloud native infrastructure and cloud migrations as core elements of their IoT and Cloud offerings.

Undoubtedly, the industrial manufacturing industry is undergoing rapid change. Only organizations with a strong IoT foundation will be able to pivot with the industry and realize impactful growth.



The integration with AWS Cloud services...

Solution

56K.Cloud is a professional services, training and technology company focusing on product acceleration, through cloud-native migration, security and enhancing developer tooling. 56K.Cloud enables customers to build on public cloud technologies and accelerate their development practices through DevOps and Agile transformation. With this they enabled across topics such as: IoT and Edge Computing with the AWS centric offering of Eurotech, following a cloud-native IT strategy, has become a central pillar of 56k.Cloud's offering.

Eurotech has taken 30 years of edge computing experience and paired it with AWS's industry leading IoT solutions to give customers a plug-and-play platform for true, holistic digital transformation.

Eurotech's IoT and Edge Computing in short: industrial-grade ReliaGATE IoT Gateways or ReliaCOR Edge Servers, incorporating a complete IoT software stack (managed Linux operating system and IoT Edge Application Framework and integration with both AWS IoT Core / AWS IoT Greengrass), enable continuous monitoring of machine performance and the implementation of adaptive diagnostic, maintenance, control, and supply strategies. Everyware Cloud (EC) installed in the AWS Cloud, is used to ensure extended health monitoring and data logging as well as remote and full lifecycle management of the edge devices.

IoT-based solutions constantly collect, compute and communicate vital data from assets in the field to the cloud. Eurotech's RaliaGATE IoT Gateways (i.e., the ReliaGATE 10-14) collect and aggregate data from as different sources such as industrial PLC's & field buses (i.e., Modbus, OPC-UA, S7, etc.), actuators, smart devices, and sensors. The established communication channels are bi-directional, meaning data can not only be collected but also control information can also be sent to the assets in the field. Digital twins of the field assets, APIs, and no-code programming of the IoT Gateway ensure efficient application development. Solid security implementation, advanced logging features and OTA (Over-The-Air) device management are foundational aspects of maintaining a low-risk posture and TCO (Total Cost of Ownership.) Seamless integration with the AWS services makes it possible to store and process data efficiently in the cloud.

Effective Development and Reduced Time-to-Market is ensured by a well-integrated and optimized building blocks and a powerful low code / no code development solution. It consists of proven Eurotech application optimized hardware (Gateways, Edge Computers) and a software stack, that includes an optimized, managed Linux operating system and Everyware Software Framework (ESF), a powerful IoT device middleware. ESF comes with a wide range of supported field protocols, addressing the development and connectivity challenges encountered in industrial automation & manufacturing applications. Finally, ready to use integrations with AWS IoT Core and AWS IoT Greengrass, ensure seamless integration with AWS services.

Clear Focus on Low TCO and Risk Mitigation can only be achieved with a sound IoT and edge computing architecture that offers features to address the major aspects that contribute to the total ownership costs on an IoT solution: device andsoftware lifecycle management, security, health monitoring and logging. Device abstraction on a middleware level does address challenges associated with changing hardware requirements and end of life of components. These risk aspects are further mitigated by long product life support, extended warranty options, and a broad

professional service offering. The seamless integration with AWS services allows customers and system integrators to leverage the benefits of AWS services without compromising requirements and best practice from an operational technologies perspective.

Ensuring an appropriate level of security (edge and IoT infrastructure) is one of the toughest challenges manufacturers and users of connected assets / machines face. Governments and other political and industrial organizations demand higher levels of security. Demanding security frameworks and certifications (i.e., IEC 62443 or NIST CSF) do provide solid guidance, but this level of security is nearly impossible to implement as an afterthought – edge devices must be designed to meet these stringent security requirements (i.e., Hardware root of trust, zero trust architecture, secure boot, etc.). Mastering these security requirements are the foundation for secure asset / device onboarding at scale or ZTP (Zero Touch Provisioning).

Beyond device monitoring and predictive maintenance, AI-based solutions are increasingly leveraged to optimize production and watch over the manufacturing floor. Eurotech's solution is uniquely positioned to simplify AI deployment. Edge AI enablement and workload consolidation is ensured by additional integrated software and hardware building blocks. Besides IoT Gateways, Industrial-grade IPC's, Edge Server, and Edge AI systems with hardware acceleration (Nvidia GPU's) provide the different compute power levels required. The software enablement required to leverage GPU power at the edge is integrated and readily accessible in ESF's no-code programming environment.

Outcome

Eurotech's solutions offer powerful connectivity and edge consolidation. Further, Eurotech's seamless integration with AWS IoT Core and AWS Device Shadows, enables vital data from the edge to be easily leveraged on the AWS cloud for analytics, business logic, and visualization.

Higher operational efficiency and Overall Equipment Effectiveness (OEE) is a core benefit of a solid IoT implementation. Being able to react in real-time to asset status and performance insights allows equipment manufacturers to optimize service schedules and improve service levels. It also allows these organizations to predict when supplies and maintenance service will be required and ensure they are offered and delivered when and where needed. Machine reliability and uptime are further improved by the implementation of machine learning (advanced analytics) in the context of predictive maintenance. Finally, advanced logging provides vital data for detailed audit trails as part of continuously ensuring service quality and compliance.

Reduction of time 70% for developing & implementing a suitable edge architecture & functionality towards local field buses. This is ensured by ready-made (pre-configured and tested) connectivity to the AWS IoT cloud and no-code edge programming. On the security side benefits where also seen with a "security baseline" as defined in IEC 62443-4-2 L2 reduces the efforts to secure the application, another win with 50% of time won back. This meant 56k Cloud could focus more on customer outcome, providing value-added integration, supporting the migration and a fast, successful project delivery.

Time measured in previous and current approach to integrate field assets like PLCs. A time reduction of over 70-80% was achieved already with the implementation of the Universal Gateway with pre-integrated field protocols (S7, Modbus, OPC-UA, DNP3, IEC 60870, M-bus, IEC 61850, LoRa, MQTT, BLE, etc.). This allowed to achieve at the edge a "security baseline" as defined in IEC 62443-4-2 L2 directive. Resulting in a significant amount of time and money, close to 50% of total projected cost.

AWS services used

Amazon EC2, AWS CloudTrail, Amazon RDS, AWS Quicksight, AWS Kinesis, AWS IoT Core, AWS IoT Greengrass, AWS SiteWise, Other...

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