WHITE PAPER

IIOT WITH AWS, INTEL AND COMPUTACENTER

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AUTHOR MARCO JACOB

1 THE INDUSTRIAL INTERNET OF THINGS (IIoT)

The digitalisation of production is progressing steadily. At the centre of this is the intelligent and physical networking of objects to ensure a coordinated, more efficient and improved day-to-day routine. The Industrial Internet of Things (IIoT) focuses on industrial applications and aims to connect and facilitate interaction between employees, machines, sensors, tools and objects in such a way that value-adding use cases can subsequently be implemented. These use cases include, for example, predictive maintenance, intelligent processing of machine data and the display of the resulting key figures, but also augmented reality glasses for picking or quality assurance (QA) processes, human-machine interaction (HMI) with mobile devices or even human collaboration with cobots (collaborative robots).

You lay the foundation for these developments in your company by creating connectivity and thereby generating data. You enrich this data with process knowledge and valuable information is created, which you migrate to a central platform such as the AWS Cloud then, enabling your users comprehensive access to the information. In evolved machine landscapes, such as those predominating in many production operations, it is a particularly complex task to filter out, collect, analyse and appropriately process the data from your systems and sensors. This requires a high level of expertise – from both the IT and OT world (OT=Operational Technology).

With its Digital Factory solutions, Computacenter boasts a broad IoT portfolio for manufacturing companies. We offer cyber-security, big data analytics, modern workplace solutions, flexible network connections and also connectivity into the AWS environment to digitalise your shop floor end to end. We unite the AWS services relevant to you in an overall architecture and ensure that you draw the correct conclusions from your data. Not only do you benefit from an increasing degree of automation and faster processes, you also reduce the resources you use, including materials. At the same time, you raise the transparency of your systems, machines, equipment and processes to ensure predictive analysis and minimise unwanted downtime. You increase your productivity while maintaining or improving quality.

SENSORS ARE CONSTANTLY BECOMING MORE COMPLEX

At the same time, the number of sensors and their complexity is constantly rising. This is because individual machines are being equipped with more and more sensors of varying functions in order to understand and optimise business processes oriented towards key figures. In addition, a growing amount of intelligence is flowing into the sensor level, making direct, digital information available for superior systems. Whereas these were simple temperature or pressure sensors in the past, today they are, for example, cameras and radar, ultrasonic or LiDAR sensors that capture images, heat, distances, reflections, etc. with exceptional levels of precision and speed. The most complex use case will probably be autonomous driving, where all these sensors collect information in parallel and pass it on to a central unit for analysis. This enables the sophisticated detection of different objects and environmental conditions so vehicles can be steered safely in traffic.

Modern sensors usually have an Ethernet-based interface or a coupling to an Ethernet-based interface via a gateway. Each sensor or gateway therefore receives its own IP address, which greatly increases the effort for the devices to be managed and also increases data traffic substantially. Due to the short cycle times required (microsecond to millisecond frequency) for the automation processes, huge amounts of data are produced that have to be sent and processed downstream. Infrastructure therefore requires a high bandwidth, storage and computing resources as well as processing power, such as that guaranteed by Intel processors.

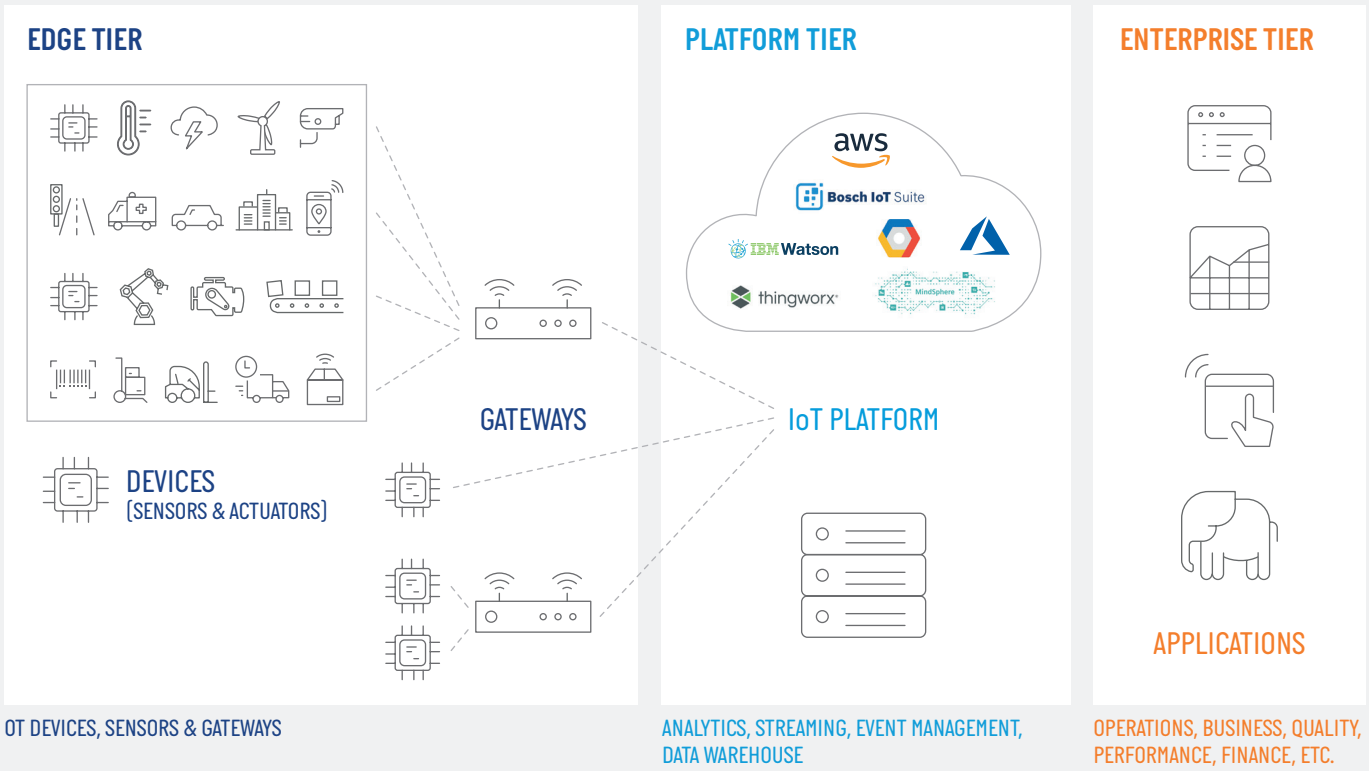
2 EDGE COMPUTING AS PRE-PROCESSING INSTANCE

To process and analyse the data generated in production, it must be transmitted to a higher-level instance. In this instance – e.g. the AWS Cloud, AWS Outpost or Splunk – further services such as AI models (machine learning, deep learning, neural networks) are applied to the data. This ensures the necessary transparency – dashboards with key figures or alerts deliver the desired insights. Actions can even be derived automatically.

However, this data transmission also brings with it many challenges. From a cyber-security point of view, it is not advisable to connect sensors directly to higher-level platforms, as this significantly enlarges the target for cyber-attacks via the new IP-based sensor level and makes this very unclear. In addition, direct data transmission without a pre-processing level can quickly become a money pit. Due to the short cycle times and the high volume of data as a result, smaller systems (20 to 30 programmable logic controllers (PLCs)) quickly incur costs of several hundred thousand euros per month for processing in the cloud. To counteract this, it is advisable to install an intermediate level – the "edge computing level". This serves as a pre-processing instance in which data can be filtered, normalised and enriched with further metadata such as units, rooms, environmental conditions, etc.

THE THREE-TIER APPROACH

The Three-Tier approach divides the OT/IT architecture of a manufacturing company into three areas.



The first area, Edge Tier, which includes the OT or shop-floor IT, groups together all physical devices: from the sensor and actuator level to the control level and edge computing. It is also called the aggregation or orchestration level.

The second area, Platform Tier, is the central platform for analysing and for storing, holding and preparing data for the end user. This is usually some form of cloud or on-premise data centre. In the future, it will be possible to map this via an on-premise cloud stack such as AWS Outpost or Azure Stack for time-critical applications.

The third area, Enterprise Tier, is the user tier. All applications such as ERP systems (SAP, Microsoft, web GUIs, etc.) run on this level. This serves to visualise the prepared data and the interaction in processes and only brings the added value for the company. Your controllers, purchasers, sales staff, production managers, line managers and shift supervisors benefit from the newly acquired transparency and intelligence of your digitalised production operations.

DIGITALISATION PROJECTS REQUIRE A NEW WAY OF THINKING

This approach shows that, in the context of digitalisation projects, we must no longer think in the usual IT mindset of individual disciplines (workplace, data centre, cloud, network and security), because then you lose sight of the benefits for the user, which puts the visible success of digitalisation projects at risk.

This is where we come in: Computacenter always puts your specific use case and thus the benefit to your users front and centre in your IIoT projects – across the whole IT architecture. Only in this way can ROI calculations, synergy effects and optimisation potential be developed and identified. We master all the individual disciplines and are able to link them together so that the frequently mentioned IT and OT convergence can really take place. This is how we lay the foundation for a successful digital transformation.

3 ONE-STOP SHOP: FROM THE SENSOR TO THE USER

Computacenter not only masters IT and OT convergence down to the smallest detail, we also compile custom-fit AWS services for you in an architecture – cost-optimised and with best practices for individual use cases. We always follow the end-to-end principle – from the sensor to the user. So you benefit from a unique one-stop shop solution.

With the data acquired from the production networks, we lay the foundation for further value-adding automation or optimisation. We use radio and wired networks to establish stable connections to, for example, autonomous vehicles, load carriers, machines and production areas – even across departments and plants. This allows us to evaluate data centrally in a cloud platform and present it to those involved at your company in a use-case-specific, clear and user-friendly manner. At the same time, we place a protective cyber-security shield over all areas of the solutions.

We support you in hardening your production with stable, flexible and robust networks as well as solutions for patch management, virus defence and monitoring. This also includes monitoring plants and equipment while processes are running as well as real-time alerts if needed.

With Computacenter, you benefit from tried-and-tested, sophisticated and securely implementable technologies that support you in ensuring efficient production free from interruptions. So you can reduce your costs significantly.

AMAZON WEB SERVICES – THE PERFECT SERVICE FOR ANY REQUIREMENT

The majority of the overarching solutions are in the cloud. This ensures connectivity with services such as the Greengrass Core or the data streaming service Kinesis at the lowest device level. To bring the data into the cloud in the correct form and quantity, you have the additional option of using the event-based Lambda functions at the edge computing level . This allows simple filter mechanisms to be built in, which not only reduces the data volume, but also the costs in the cloud.

As soon as the data arrives in the cloud, you have more than 170 services (as of April 2021) available to you in the Amazon Web Services world for a vast array of use cases. From artificial intelligence to the storage of data, container options or the automation of processes all the way through to user-defined evaluation and presentation to create the transparency required for business transactions.

To build such a cross-functional solution, you need a lot of domain knowledge from a variety of areas: starting with an in-depth understanding of all production steps and the associated equipment, through to all other IT disciplines, to build a functioning, secure solution. However, companies often lack suitable specialised staff.

4 THE DIGITAL FACTORY: DIGITALISING THE SHOP FLOOR

As a comprehensive solution provider with over 800 consultants in Germany, Computacenter combines all disciplines under one roof. Based on our extensive portfolio and our experience in the procurement, transformation and management of IT infrastructures, we have created our “Digital Factory” for you. With our solution package, we help you to make decisions fit for the future in a complex and fast-moving world. We support you in raising your productivity and the value of your OT.

Our broad IIoT portfolio ranges from network and workplace to data collection and data management, analytics, security platforms and cloud platforms. When digitalising your production IT, you benefit from our expert knowledge, tried-and-tested solutions and many and varied use cases. We support you in increasing your overall plant effectiveness and availability, protect your production from attacks and establish reliable network connections. Our modern workplace solutions also enable greater efficiency and improve your employees’ job satisfaction.

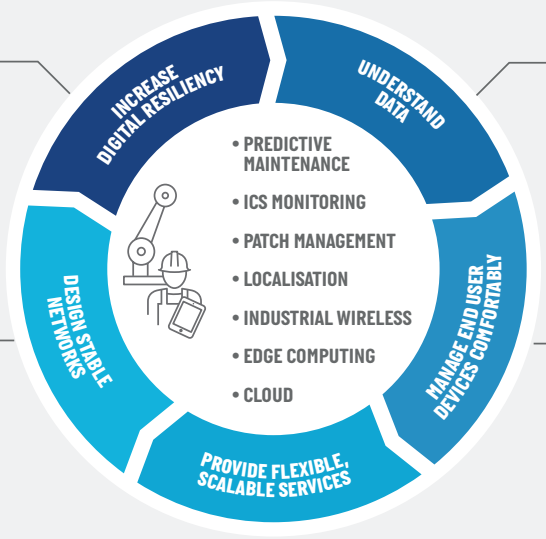
DIGITAL FACTORY PORTFOLIO AT A GLANCE

INDUSTRIAL SECURITY

Protect assets, fend-off, detect and effectively respond to cyber attacks

INDUSTRIAL ANALYTICS

Gain transparency and new insights



INDUSTRIAL NETWORKS

Connect factories, appliances, machines and data centers dynamically and reliably

INDUSTRIAL WORKPLACE

Select and source mobile devices efficiently and manage them throughout their lifecycle

INDUSTRIAL IOT PLATFORMS

Use IIOT platforms to distribute production data, use resources efficiently and leverage new potential quickly

Increase digital resilience: We harden your production, the core of your value creation. To protect you from attacks, we use state-of-the-art patch management, virus defence and monitoring solutions. At the same time, we monitor your systems and equipment while processes are running and alert you in real time if necessary. We protect your company's knowledge and values and increase the digital resilience of your production operations.

Understand data: We use our data acquisition solution to extract your system data. We supplement this with important information, establish connections and dissolve complex production processes – without interfering with ongoing processes. This makes use cases such as predictive maintenance or key figure monitoring easy to implement. Thanks to individual dashboards, we provide you with clear cockpits to simplify your day-to-day work.

Conveniently solve device management: We equip your workplaces with intelligent technologies that make work easier – from augmented or assisted reality and smart wearables to intelligent data collection devices. In doing so, we support you throughout the entire life cycle: from selecting the right technology, procurement and device management to the disposal of your equipment.

Create stable networks: To make sure your network infrastructures are stable, flexible and robust, we help you with the conception of networks, the design and selection of suitable components and the implementation of monitoring solutions. Thanks to sensible segmentation and separation of OT and IT, we ensure a secure connection between your production and your own data centres or the cloud. We make sure that your production networks are available permanently and free from interruptions, and that the communication between machines and systems works smoothly.

Use resources more effectively: IIoT platforms have long been a central hub for your production data. To perform comprehensive process analyses, all information must be aggregated centrally. IIoT platforms make more effective use of resources, offer a high degree of flexibility in the use of services and enable a high level of scalability and rapid implementation of use cases.

5 GENERATING GRANULAR DATA WITH THE PDEX

We have developed a modular analytical kit that covers our three main areas of application:

- Production monitoring (monitoring of systems and quality, visualisation of current states as well as plant information)
- Production efficiency (predictive maintenance and increasing efficiency by fine-tuning production parameters)
- Industrial security (integrity control for production facilities)

You get an analytics solution that is customisable to your needs and addresses your challenges with regard to transparency for machines and the resulting questions. You can view production data and immediately identify errors or malfunctions and react to or rectify these accordingly. Thanks to our experience from a wide variety of analytics projects and the modular kit, we can respond quickly and efficiently to your questions.

With our PDEX (production data extractor) we perform a targeted production data analysis. The PDEX intervenes in your system communication natively and passively and retrieves highly granular data from the communication between the system control and your end devices – regardless of where the data originates from. With our PDEX we also address the edge computing level – data is processed directly where it is generated. The PDEX acquires, processes, enriches and merges data with other metadata for subsequent storage and analysis in the AWS Cloud or Splunk. This lets you generate dashboards and draw corresponding conclusions.

6 SUMMARY: HARNESSING THE FULL POTENTIAL OF AWS IOT WITH COMPUTACENTER AND INTEL

AWS offers a wide range of global cloud-based products, including data processing, storage, databases, analysis, networking, mobile, developer and management tools, IoT security and enterprise applications. Thanks to these services, you can react faster, reduce your IT costs and scale applications. AWS IoT makes it possible to connect IoT devices to the AWS Cloud without having to operate your own data centre. AWS currently provides over 170 services.

With our experience and more than 160 certified AWS employees, we select the solutions, funding and terms from the extensive range of AWS services to match your requirements – and we do this in a way that optimises costs and applies best practice for individual use cases. You benefit from our digital solutions in all areas – from security, analytics and edge computing to the use of cloud platforms, the workplace and network. We take an integrated approach to the IT infrastructure of your production facility and thus harness cost reduction potential across solutions – from the digitalisation of production IT, predictive maintenance and container tracking to greater security and thus more stable production. This means that machine states can be read out and problems detected and rectified as they arise, maintenance costs are reduced through optimised maintenance, plant effectiveness is improved, and quality and ultimately customer satisfaction is enhanced.

We empower you to draw the right conclusions from the generated data with appropriate analyses, prepared in dashboards suitable for the target group. At the same time, we satisfy strict data protection requirements and ensure that only authorised persons are allowed to view data and prepare analyses. We master IT and OT convergence down to the last detail and always follow the end-to-end principle – from the sensor to the user. So you benefit from a unique one-stop shop solution.

Intel processors form the basis for this powerful, reliable and fast data transmission at edge computing level as the foundation for intelligent IoT solutions. Thanks to the new Amazon EC2 i3en.metal instances powered by scalable Intel® Xeon® processors, you can enjoy the benefit of high network throughput and lower latency. So you can harness the full potential of AWS IoT with Computacenter and Intel.

DO YOU WANT TO KNOW MORE?

Get in touch with your Computacenter account manager to arrange a consultation with one of our experts

Computacenter

Computacenter plc
Hatfield Avenue, Hatfield, Hertfordshire AL10 9TW, United Kingdom

computacenter.com
+44 (0) 1707 631000