SICK AG WHITE PAPER

CLOUD SOLUTION VS ON-PREMISE SOLUTION

BASED ON THE EXAMPLE OF CONDITION MONITORING | SMART DATA SOLUTIONS, 2019-12

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SUMMARY

Numerous companies these days are faced with a dilemma when it comes to the question of whether a cloud or on-premise application is the correct choice for the solution implemented at the company. For many this raises the question: "Should I host my software myself, or trust the cloud after all?" The topic of "cloud vs on-premise solution" is frequently discussed, in particular in the area of data-based services, for example condition monitoring. Only a decade ago, the on-premise solution was the widely accepted standard in the industry. Now more and more companies are focusing on the cloud. Both options have their advantages, which need to be weighed up on a case-by-case basis. The advantages and disadvantages behind both solutions, the myths that surround the cloud, and how the cloud solution is put into practice at SICK AG based on the example of condition monitoring is described in detail in the following white paper.

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1. Introduction

More and more companies are investing in condition monitoring in conjunction with IoT cloud solutions to avoid the inefficient operation of a machine or downtimes due to wear-related damage. By continuously monitoring the state of individual systems, it is possible to visualize their status information in real time with the help of sensors, and to convert the previously unused sensor data into added value for the customer. For example, a fast and also reliable safety system can be designed on the basis of the sensor data that allows a status-oriented maintenance of the systems. Besides maintaining the efficiency of the machines, IT security is also a primary concern with data-based services.

Due to the strong focus on IT security issues in the area of condition monitoring, the customer is faced with the following question when deciding how to implement the condition monitoring: cloud or on-premise solution?
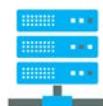
1.1 Definitions compared

Cloud solution
A **cloud solution** refers to the provision and operation of IT infrastructure and IT services, for example application software, over the Internet (**software as a service**).
On-premise solution

An **on-premise solution** refers to a **locally installed** software solution. In this case the software is installed and operated on a server or system at the customer's premises.

1.2 System overview

Cloud computing and edge computing are enabled by the ability to communicate within a local network (TCP/IP). TCP/IP initiates the communication between the sensor, industrial PC, PLC and gateway. For cloud computing this occurs via a suitable IoT interface, and for edge computing via an edge device. By implementing a condition monitoring solution in the cloud, it is possible to visualize, diagnose, and monitor the sensor data as a web service. In the case of an on-premise solution, this occurs within the customer's network on a locally provided server with no connection to the Internet.
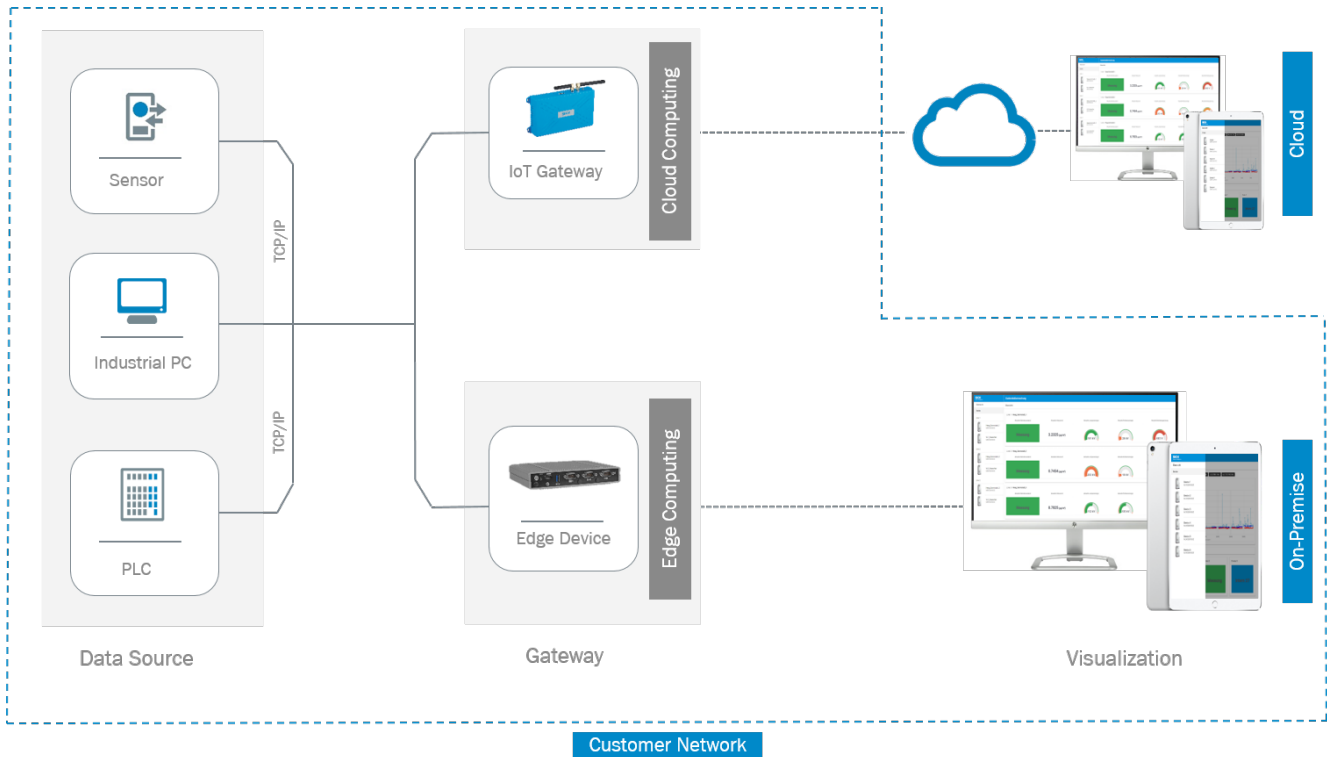

Fig. 1: System overview of a cloud solution and on-premise solution

2. Cloud services

The cloud is changing the traditional thinking of numerous companies in regards to IT resources. There are significant reasons why a company will decide for or against cloud services. Important factors include, for example, costs, speed, scalability, reliability and security. Furthermore, there are often concerns about data security, control and complexity with the cloud option. These concerns do not apply in all cases.

2.1 Advantages and disadvantages

Advantages	Disadvantages
Fast support and updates are included in the price	Less scope for customization
No investment in servers and their operation	Requires a continuously functioning Internet connection
Low implementation and maintenance costs	Ongoing costs for software licenses
Guaranteed data security and backups by the cloud provider	Data must be passed on to the cloud provider
Compared to an on-premise solution, higher compatibility thanks to interface to other applications	
Suitable and simple user interfaces	
Flexible price models with short contract terms	
Operating system independent due to use of a web browser	
Scalability allows further cloud services such as predictive maintenance	

2.2 Myths about the cloud

"The data are not secure."
The growing awareness of data security is the reason for this kind of statement. A study by the auditing and consulting firm PricewaterhouseCoopers (PwC[1]) showed that companies consider the issue of cloud security to be very important. This is due, amongst other things, to the current increased interest in the issue of security in the cloud. In the worst case scenarios, large security gaps can destroy the entire business model, which is why the providers of cloud services pay particular attention to internationally certified and agreed security standards. These providers therefore actively seek to ensure the security of their systems. They perform continuous updates to increase the level of security. They also employ encryption to prevent unauthorized intrusion into the data traffic. This blocks any access to the data stored and saved in the cloud. Compared to an on-premise solution, using a cloud solution results in a significantly lower overall expenditure on data security for the company.

"Loss of control over your own IT infrastructure."
The transfer of responsibility for the company-internal IT infrastructure from the customer to the cloud provider is limited to a predefined, clearly delimited function. Only smaller tasks relating to the operation and maintenance of the servers and operating systems, for example updates and background processes, are transferred to the cloud provider. This saves customers time, allowing them to focus more strongly on their local users and locally operated applications. These applications are often connected to the cloud. It also frees up more time for optimizing and maintaining the existing IT infrastructure.

"Managing cloud solutions is complicated."
Companies are often afraid to use cloud solutions because they are too complicated to manage. These concerns predominantly arise when the cloud needs to be connected to the customer's on-site network. Most cloud providers, however, offer wizards for various tasks as well as web portals that enable the tasks to be completely quickly and easily. Furthermore, cloud providers offer comprehensive and intensive support, and also provide their customers with documents to help them get up to speed with the cloud-based technology.

[1] https://www.pwc.de/de/prozessoptimierung/assets/cloudcomputing-studie.pdf

2.3 A practical example: the Monitoring Box from SICK

The Monitoring Box is a new Smart Services web application from SICK. It enables device parameters to be visualized through diagnostic functions, and statuses or vital details to be monitored (condition monitoring). The Monitoring Box comprises **a browser application, server-side data management, IoT gateway (TDC-E)** as well as suitable **pre-defined SensorApps** for easily connecting SICK sensors to the Monitoring Box. Access administration for users is via the **SICK ID**.

Fig. 2: Components of the Monitoring Box

SICK currently offers a cloud solution with cloud integration. This offering includes, amongst other things, a fast and cost-effective cloud integration during ongoing production as well as the automated provision of updates, which are included in the license fee. The cloud solution is operated by SICK. SICK also offers remote services via the cloud, thereby ensuring a quick support response as well as guaranteeing their availability when a service call is raised. Product customizations are also possible: SICK hosts these in the cloud and transfers them via a web browser. Data security is ensured at all times.

3. On-premise services

Like cloud solutions, on-premise solutions also come with advantages and disadvantages. A clear advantage in this case, however, is that the customer has full control over the entire IT system. The responsibility for data security lies with the customer and needs to be guaranteed by their inhouse IT department. Managing on-premise solutions can be complicated for the user due to the lack of transparency of the infrastructure. The same applies to remote data access.

3.1 Advantages and disadvantages

Advantages	Disadvantages
Data storage on local servers	High initial costs for servers and implementation (license, setup and installation fees)
No Internet access required for data access	Hardware costs (e.g., servers or backups)
Unrestricted control over the entire IT system	Cost of maintenance, support, updates
Lots of scope for customization	Depends on the specific operating system
	Remote data access is possible in principle, but generally complicated and slow
	Responsibility for data security lies with the customer (for example performing backups)
	The customer must establish their own support structure for maintenance or request a service technician
	The functional scope is limited to the features that were included with the product

3.2 Does the on-premise solution resolve the myths about the cloud?

"Are the data secure?"
All data are stored locally at the customer. The customer therefore needs to ensure the security of its IT infrastructure. To what extent this meets the customer's requirements with regards to internal processes and company secrets needs to be clarified upfront between the provider of an on-premise solution and the customer.

"Do I have control over my own IT infrastructure."
Since the entire IT system is in the customer's hands, it is possible for them to have unrestricted control over the entire system.

"Is managing an on-premise solution complicated?"
The responsible technical department of the customer will look after the data management. Data management can be very complex. It is becoming ever more difficult for IT employees to fully monitor the increasingly complex and non-transparent IT infrastructures and to intervene when faults arise. Remote data access is also complicated: it either does not work at all or is very slow.

4. Cloud solution vs on-premise solution

Which solution provides the greatest benefit depends on the requirements and resources of a company. Both solutions should therefore be directly compared at the beginning.

4.1 Direct comparison of both solutions

	Cloud solution	On-premise solution
Costs	Reduction in costs through outsourcing of IT tasks. This makes it possible to reduce computing center expenses and personnel costs.	High costs for purchasing and operating the required hardware, and the effort required to implement the solution on the edge device varies depending on customer requirements.
Availability	Cloud providers seek to provide their customers with a continuous connection to the cloud infrastructure. This can sometimes lead to bottlenecks when millions of users access the cloud infrastructure.	The data is permanently available because the customer is not dependent on the Internet. The customer has to take care of all updates, and organize support when faults arise. This can lead to delays in data availability.
Safety	The cloud provider ensures maximum data security.	The data remains in the company and is not passed on to third parties. The customer is responsible for data security themselves.
Updates	Automated provision of updates is included in the license fee.	Additional costs for updates and add-ons through manual updates.
IT infrastructure	Service and operation of the IT infrastructure by the cloud provider.	Service and operation of the IT infrastructure by the customer.
Support	When a fault arises, fast support through remote access over the cloud.	When a fault arises, a service technician needs to be called out.
Features	The cloud provider offers product customizations.	The functional scope is limited to the features that were included with the product.

4.2 Cost comparison

When comparing the ongoing costs of both solutions, it is apparent that the cloud solution does not incur high additional costs for maintenance and upgrades, internal IT tasks, personnel, and implementation. The costs to the customer of a cloud solution are limited to the predefined license fees or the respective current or agreed usage level. The cloud provider is responsible for hosting, maintenance, required updates, investment costs, and the purchase of new hardware. These costs are covered by the monthly license or usage fee paid by the customer; no further expenses are normally incurred.

Numerous companies that have already chosen cloud solutions have achieved savings in the following areas:

- Purchase of server hardware
- Personnel costs
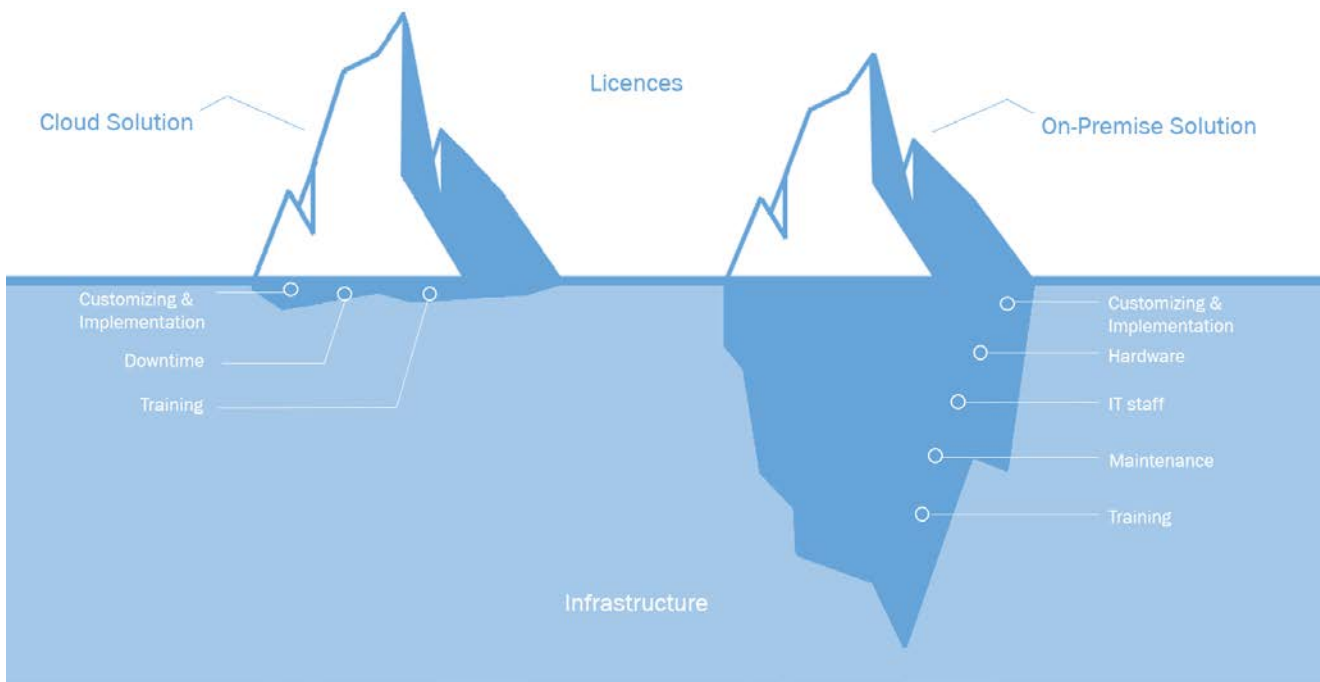- Power consumption
- Operating costs

Fig. 3: Iceberg model: cost comparison of a cloud and on-premise solution

5. Conclusion

It is not possible to say upfront which solution will be suitable for any given company. Companies with especially high customization requirements may benefit from an on-premise solution, even if this is associated with a high investment cost. The trend in recent years, however, is that cloud solutions are clearly gaining in popularity while on-premise solutions are increasingly losing significance. The stated advantages of cloud solutions, for example reduced costs, faster support in the event of faults and operating system independence, are decisive factors. A further advantage lies in the quick scalability to additional solutions, and the flexibility this option offers to customers. If the cloud service is no longer required, the customer can terminate the relevant contract at short notice.

For data-based services, the cloud solution is preferable to an on-premise solution because the integration effort and the costs for the cloud solution are significantly lower than for an on-premise solution. Furthermore, ongoing support from experts is guaranteed in the case of the cloud solution.

Before deciding for or against one of these solutions, each customer must consider which brings them the greater benefit. With the help of the advantages and disadvantages of both solutions presented in this white paper, the customer will be able to make a sound decision however.

REFERENCES

www.sick.com/sds