

Cloud Application in Modern 4.0 Industry

1. Purpose of the exercise:

The aim is to construct a measurement system based on a cloud service and to get to know cloud applications and their capabilities in modern Industry 4.0.

2. Tasks to be completed:

- Carrying out the hardware configuration of the communication gateway.
- Creation of dashboards monitoring electricity and power network parameters in real-time.
- Defining alarms and alerts.
- Generating reports.
- Determine the possibilities and scope of application of the tested solution.

3. Theoretical introduction

4.0 Industry, the fourth industrial revolution, is characterized by advanced digital technologies such as the Internet of Things (IoT), artificial intelligence (AI), and big data to increase efficiency, optimize processes and introduce innovative solutions. A cloud application is one of the critical tools supporting the development of Industry 4.0.

Advantages of cloud applications:

- scalability and flexibility - enable easy adaptation to the changing needs of enterprises,
- low implementation costs - enterprises do not have to invest in expensive equipment or IT infrastructure, leading to lower system implementation and maintenance costs.
- availability and mobility - they allow access to data and applications from any place and device, which gives users greater flexibility and mobility at work,
- data security, and backup - a good cloud infrastructure ensures a high level of data security, protection against data loss, and regular backups.



Disadvantages of cloud applications:

- dependence on a cloud provider - the use of cloud applications means dependence on a cloud service provider, which may involve some risk, e.g., changes in pricing policy, data security, or service availability.
- unreliability of Internet connectivity - an uninterrupted connection to the Internet is required. Connectivity issues can lead to limited access to data and applications.
- data bandwidth limitations - in the case of large data sets, the transfer between local systems and cloud applications may be limited by the bandwidth of the Internet network.
- data privacy - there is concern about the privacy of data stored in the cloud, especially for confidential or sensitive information. It is necessary to secure data and comply with privacy policies properly.

Cloud infrastructure consists of physical servers, networks, and storage devices. Cloud computing provides a scalable and flexible environment that allows to store and process data and provides applications and services via the Internet. As a result, enterprises do not have to invest in expensive equipment and IT infrastructure but have access to unlimited computing power and resources from anywhere. They offer a wide range of functionalities that can be used in various areas of industry. They allow to store, manage and share data in a secure and scalable way. As a result, it is possible to easily share information and collaborate at the organizational level, which contributes to increasing work efficiency.

In addition, cloud applications enable computing services such as real-time processing, data analysis, machine learning, or application development. All these are available online, which gives flexibility and mobility in using the software.

In the context of the 4.0 Industry, cloud applications are widely used. Enterprises can use them to monitor and manage IoT devices, analyze big data sets to make better business decisions, optimize production processes, and create intelligent systems supporting production. In addition, they enable the introduction of Software-as-a-Service (SaaS) business models, which means enterprises can use ready-made applications and services without investing in their development and maintenance.



Cloud applications are a crucial tool in the modern 4.0 Industry. They allow the use of a flexible and scalable cloud environment that supports data storage, processing, sharing, and the implementation of advanced functionalities, such as data analysis, machine learning, or the creation of intelligent systems.

4. Guidance questions - check yourself

- What is cloud computing, and what are its main advantages in the context of the 4.0 Industry?
- What are the main characteristics of computing servers used in the cloud?
- Discuss the importance of security in the context of cloud computing.
- What are the potential security risks in the cloud, and what are the strategies to mitigate these risks?
- How does the hardware infrastructure affect the flexibility and scalability of cloud applications?
- What are the main differences between a public cloud and an on-premise solution?
- Why are hardware solutions crucial for the implementation of the 4.0 Industry?

5. Exercise program

PART I - HARDWARE

- A. Launch the EkipConnect desktop application.
- B. Configure the network connection according to the instructor's instructions.
- C. Connect the RJ-45 network cable from the computer directly to the configuration port of the communication gateway.

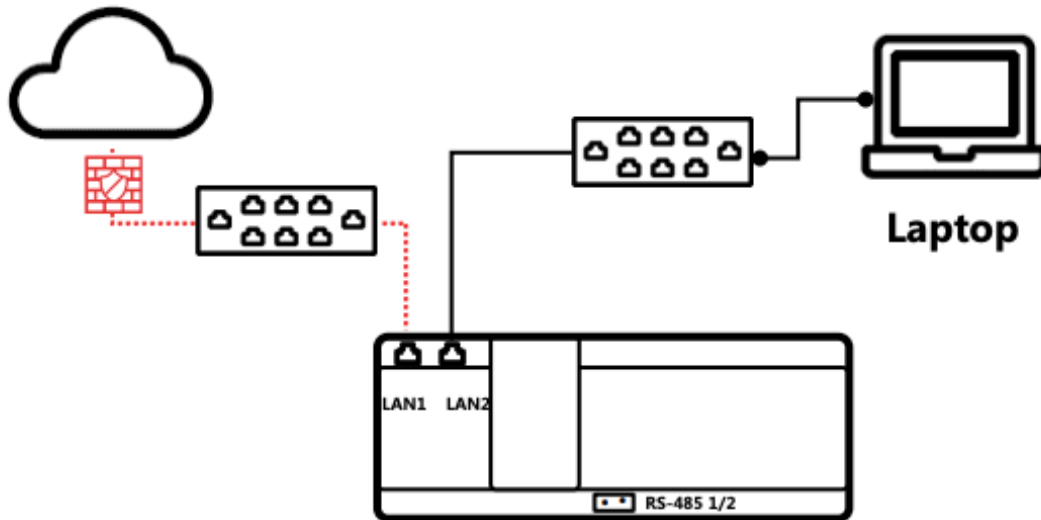


Figure 1. The method of connecting the communication gateway with the network infrastructure

D. Start pairing mode in communication gateway (6. DIP switch in ON position)



Figure 2. DIP configuration switch

- E. Use the EkipConnect app to add the gateway to the cloud service.
- F. Search and add other devices cooperating with the gateway.
- G. Save the settings.
- H. Generate a device configuration report.
- I. Disconnect the computer from the configuration socket.
- J. Log in to the ABB cloud environment via <https://sitemanager.ability.abb> (the teacher provides data necessary for connection).
- K. In the "Explore -> Connectivity" tab, check the connection status with the communication gateway and other peripheral devices.

PART II - SOFTWARE

- L. Log in to the ABB cloud environment via <https://sitemanager.ability.abb> (the teacher provides data necessary for connection).
- M. Familiarize yourself with the user interface.
- N. Create a dashboard that allows monitoring of the power network parameters using devices connected to the application.
- O. Create conditional events depending on the voltage change to control the voltage value. Simulate an emergency. Check if the alert works.
- P. Create conditional events depending on the load current to realize the function of overcurrent protection or power guard. Simulate an emergency. Check if the alert works.
- Q. Create conditional events depending on the state or change of digital inputs. Simulate an emergency. Check if the alert works.
- R. Generate a report summarizing the measurements taken during the exercise.