TwinCAT Analytics
BECKHOFF IPC based automation: The perfect platform for IoT

Cloud:
- all kind of cloud systems

Transport:
- support of legacy and standards

Smart:
- Extendable by customer logic
  - with local logic
  - With local data storage

IO signals
- endless possibilities
- **TwinCAT IoT Product Family**

  - TF670x IoT Communication
    - Publish/Subscribe data exchange via MQTT/AMQP

- TwinCAT

  - Mqtt_Publish(topic, object)
  - object Mqtt_Subscribe(topic)

- Realtime State Machine
- **TwinCAT IoT Product Family**
  - **TF670x IoT Communication**
    - Publish/Subscribe data exchange via MQTT/AMQP
  - **TF671x IoT Functions**
    - Easy connectivity for Public Cloud services
    - Microsoft Azure and Amazon AWS

Windows Azure
Amazon AWS

TwinCAT

- FB_AzureIoHubSend
- FB_AzureIoHubReceive()
- **TF670x IoT Communication**
  - Publish/Subscribe data exchange via MQTT/AMQP

- **TF671x IoT Functions**
  - Easy connectivity for Public Cloud services
  - Microsoft Azure and Amazon AWS

- **TF672x IoT Data Agent**
  - Gateway application for Cloud connectivity
  - Easy configuration without programming
**TwinCAT IoT Product Family**

- **TF670x IoT Communication**
  - Publish/Subscribe data exchange via MQTT/AMQP

- **TF671x IoT Functions**
  - Easy connectivity for Public Cloud services
  - Microsoft Azure and Amazon AWS

- **TF672x IoT Data Agent**
  - Gateway application for Cloud connectivity
  - Easy configuration without programming

- **TF6730 IoT Communicator**
  - Easy integration of mobile devices

- **TF6735 IoT Communicator App**
  - Smartphone App for TF6730
- **TwinCAT Analytics Product Family**

  - **TF3500 Analytics Logger**
    - Cyclic archiving of the process image

  - **TF3520 Analytics Cloud Storage**
    - Message Broker
    - Save data in public or private cloud systems

  - **TF35xx Analytics Workbench**
    - Engineering solution consisting of useful components
    - On- and offline analyses for one and more machines

  - **TF3520 Analytics Library**
    - PLC library used for online or offline analysis
Machine builders:

- Reduction of machine costs
- Easy machine optimization
  - Software: Processes and algorithms
  - Mechanism/Electricity: Dimension and power demand
- Simplified diagnosis / predictive maintenance
- New business models

Aim: Increase of competitive ability!!
End customers:

- Reduction of production costs
- Increase product quality
- Reduce machine shutdown times
- Higher productivity

**Aim: Increase of competitive ability!!**
TwinCAT Analytics – based on IoT communication

Publisher / Subscriber concept with MQTT/AMQP

Advantages
- Devices do not need to know each other → decoupling of applications
- All communication is outgoing → easy firewall configuration → easy setup in IT infrastructure
- MQTT/AMQP → lightweight, standardized protocols → high performance
- TF3500 Analytics Logger
  - Cyclic archiving of the process image
Cyclic data-logging:
- Process image
- PLC application
- NC etc.

Easy configuration

IoT communication via MQTT

Optional: file based
- **TF3500 Analytics Logger**
  - Cyclic archiving of the process image

- **TF3520 Analytics Cloud Storage**
  - Message Broker
  - Save data in public or private cloud systems
- IoT Storage Client for TwinCAT Analytics
- Storage of process data or analytics solutions
- Documented topic-hierarchy and data description
- TwinCAT or 3rd Party IoT Clients can subscribe on data or publish data

```
Topics hierarchy:
- Storage
  - c1
  - c2
  - dataDescription
  - readRequest
  - readResponse
  - write
  - c3
```

```
Azure Blob       SQL Azure       Storage 3       Storage n
TC Analytics Cloud Storage Provider
3rd Party IoT Client
TC IoT Communication Client
TC Analytics Logger
Message Broker
```
TwinCAT Analytics

- **TwinCAT Analytics Product Family**

- TF3500 Analytics Logger
  - Cyclic archiving of the process image

- TF3520 Analytics Cloud Storage
  - Message Broker
  - Save data in public or private cloud systems

- TF35xx Analytics Workbench
  - Engineering solution consisting of useful components
  - On- and offline analyses for one and more machines
TwinCAT Analytics Workbench

- TwinCAT Analytics Workbench Base
  - TC PLC Runtime
  - TC Scope View Professional
  - TC Analytics Configurator
  - TC Analytics Library
  - TC IoT Communication
- TwinCAT Analytics Extensions
  - TC Analytics Condition Monitoring
  - TC C++
  - TC Matlab®/Simulink®
TwinCAT Analytics

- TwinCAT Analytics Product Family

  - **TF3500 Analytics Logger**
    - Cyclic archiving of the process image

  - **TF3520 Analytics Cloud Storage**
    - Message Broker
    - Save data in public or private cloud systems

  - **TF35xx Analytics Workbench**
    - Engineering solution consisting of useful components
    - On- and offline analyses for one and more machines

  - **TF3520 Analytics Library**
    - PLC library used for online or offline analysis

  Analytics Cloud Storage

TwinCAT Analytics

Realtime State Machine

VM VM VM
TwinCAT Analytics Library

- PLC library for online and offline analysis
- Features:
  - Threshold Monitoring of digital and analog values
  - Timing-Analysis: total, min, max and average
  - Life cycle Monitoring
  - RMS calculation
  - Condition analysis
  - Energy calculation
- Easy configuration with TwinCAT Analytics Workbench Base ⇒ TwinCAT Analytics Configurator
TwinCAT Analytics Scenarios – Local

- Cyclic data logging
- Run local analyses
- Local data storage
TwinCAT Analytics Scenarios – Private Cloud

- Communication based on IoT technology
- Cyclic data logging of different machines
- Use private cloud computing within your network to analyze and aggregate data
Public cloud computing to realize global machine analysis
Thank you