



Integration of IEC 61499 with OPC-UA

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Contents

- Current trends in industry
- Motivation for our work
- Brief intro to IEC 61499 and OPC-UA
- Our solution
- Demo application
- Conclusions



Current trends in Factory Automations

- Horizontal and Vertical integration of IT systems for optimization of production processes
- Shift from mass production to mass customization
- Increased support for integration of equipment coming from various vendors
- Industry 4.0, Smart Factory, Digital Factory, ...



Industry 4.0 in Politics

The German **Chancellor Ms. Angela Merkel** and the **Czech Prime Minister of the Czech Republic Mr. Bohuslav Sobotka** visited CTU on August 25, 2016. in Prague. Both distinguished visitors participated at the *discussion on the Czech national initiative Industry 4.0.*






Motivation

IEC 61499



OPC-UA



Flexible control system seamlessly running through various components of automation systems

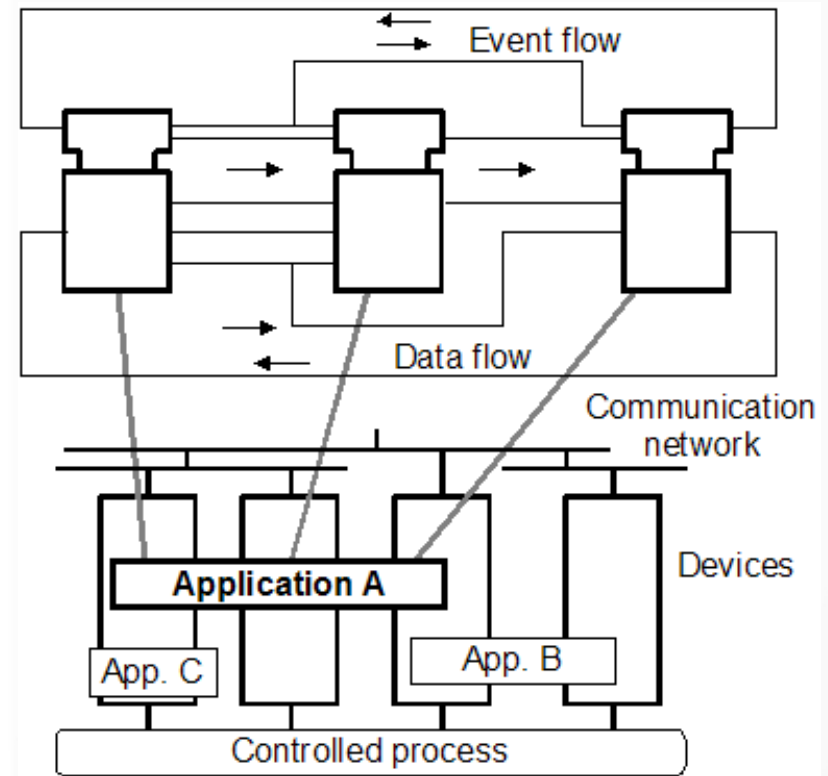
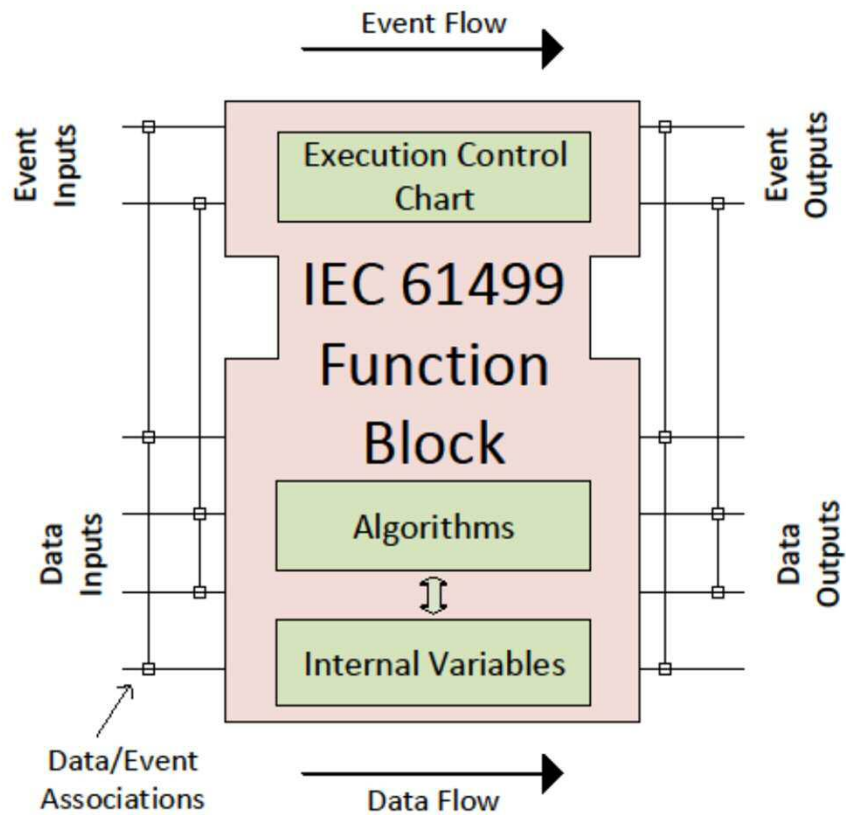


IEC 61499

- Proposed in 1990s as a new paradigm for holonic and agile manufacturing systems
- Requirements
 - Flexibility, Adaptivity and Distribution
- Goals
 - Standardized architecture for distributed control
 - No need for central control device
 - Dynamic reconfiguration



Function Block as a key element





OPC-UA

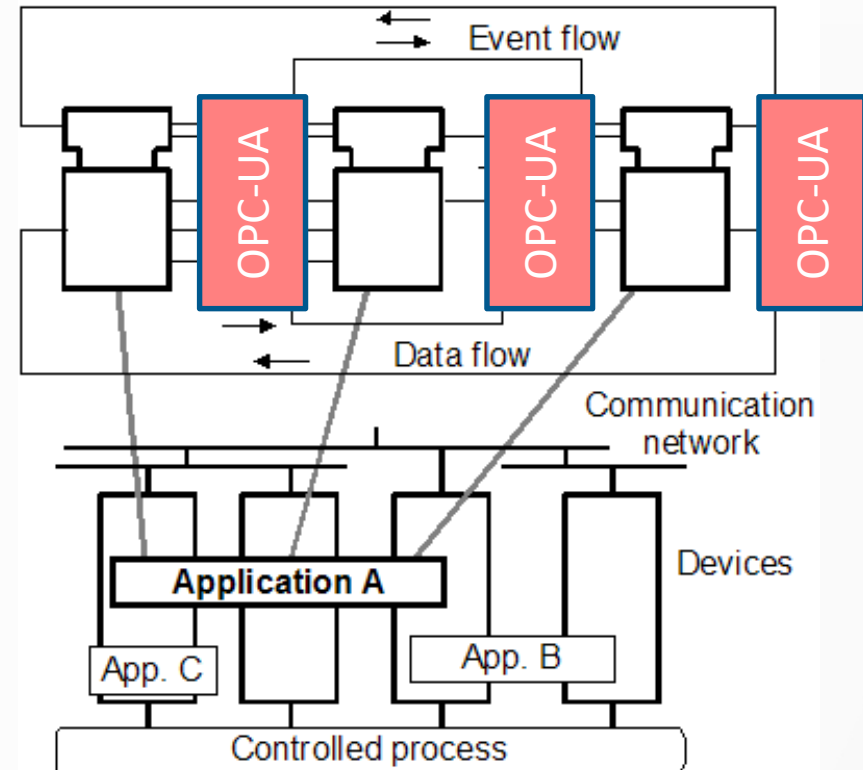
- Technology for exchange of information
- Platform and vendor independent
- Standardized communication (ok for Firewalls)
- Based on SOA principles – Generic services predefined by OPC-UA





- Benefit from the growing adoption of OPC-UA to seamlessly connect distributed FBs.

Goals (1/2)





Goals (2/2)

- Automatic creation of the OPC UA information model according to the IEC 61499 application structure



Tool Chain

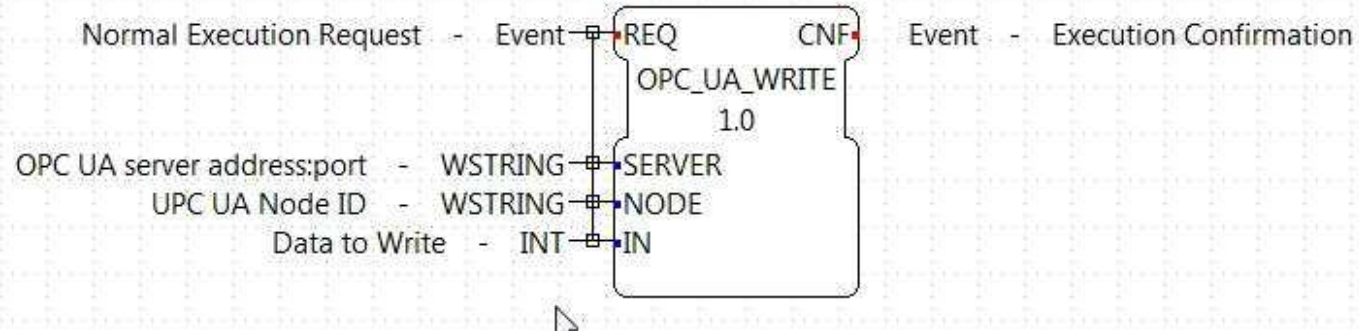
- IEC 61499
 - 4DIAC IDE
 - 4DIAC RTE (FORTE)
- OPC-UA
 - open62541



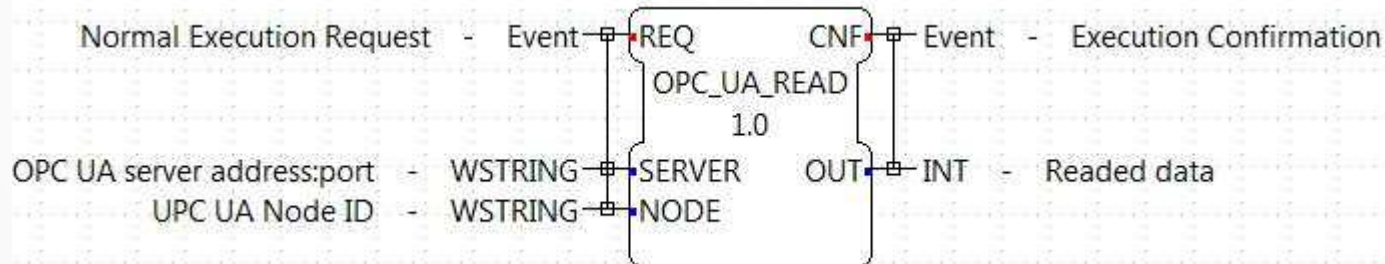


New Function Blocks: Read/Write

- FB OPC_UA_WRITE



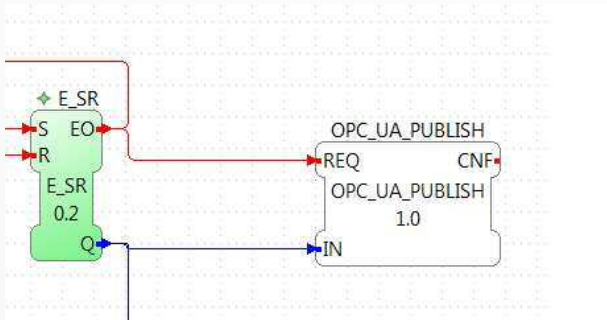
- FB OPC_UA_READ



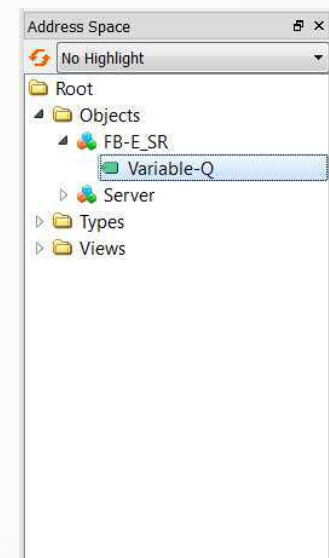


New Function Block: Publish

- FB OPC_UA_PUBLISH
 - Creates new data node in the information model
 - Uses the structure for automatic node name compilation: **FB.Variable**
 - Special server for each resource



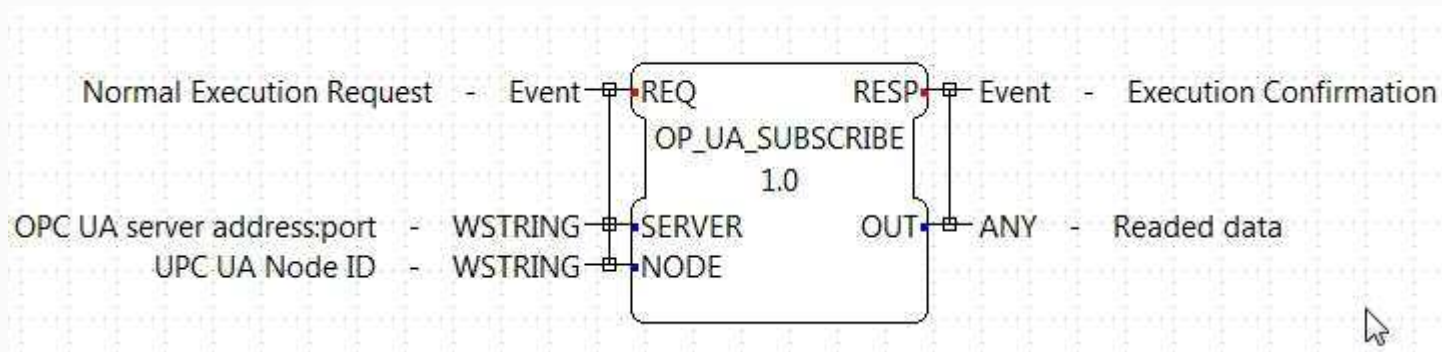
```
FB node not found
Created new object E_SR
Created new object E_SR.Q
```





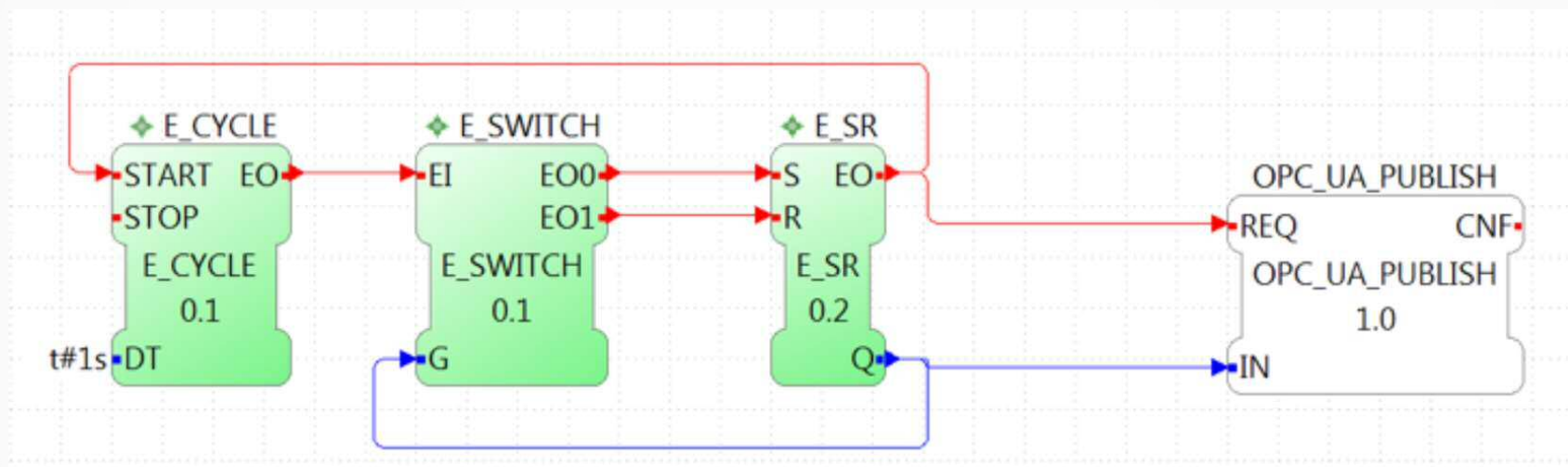
New Function Block: Subscribe

- FB OPC_UA_SUBSCRIBE
 - Subscribes to an existing node of the information model
 - Notified when a change occurs





Demo Application





Conclusions

- 4DIAC platform is being continuously developed by active community members
- Structural information can be transformed into OPC-UA information model



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Thank you for your attention!

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