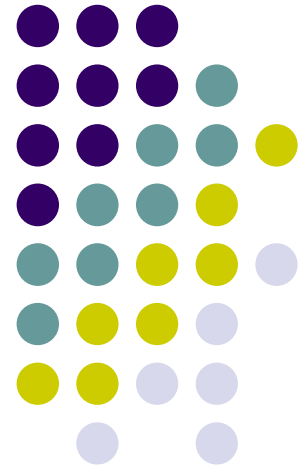


IEC 61499 and Fieldbus

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IEC 61499 and Fieldbus



- These are not the same types of entity
- Nor are they competitors
- Fieldbus is a communications protocol
- IEC 61499 concepts are the basis for the design and modeling of intelligent systems built from networks of intelligent devices
- IEC 61499 complements Fieldbus



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Fieldbus

- The Fieldbus solutions are basically “wire protocols” for transferring bits of data to between devices.
 - field devices sensor/actuators from different vendors become compatible and can be interchanged.
- The goal is interoperability at a peer to peer level and IEC has initiated development of a Fieldbus Standard - IEC 61158.





Fieldbus Standard

- IEC 61158 Fieldbus standard was planned to cover peer to peer communication through the complete ISO communications stack from the physical to application protocol layers
- The standard has been a long time in development mainly because of conflicting requirements.



Proprietary Solutions



- In the meantime, a variety of proprietary Fieldbus solutions have emerged
 - e.g., MODBUS, PROFIBUS, etc.



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PROFIBUS/PROFINET



- PROFIBUS (Process Fieldbus)
 - industrial network system for real-time distributed control – a SIEMENS product
- PROFINET
 - a set of Fieldbus protocols which were introduced several years ago and are developed by the PROFIBUS organization – SIEMENS led



PROFINET Functionality



- Three different types :
 - I/O Controller
 - a controlling device for one or more field devices.
 - I/O Device
 - a field device which is connected to the activators and sensors in the field level and delivers these data to the I0-controller
 - I/O Supervisor
 - an engineering device which manages the provision of configuration data (parameter sets) and the collection of diagnostic data for/from I0-controllers





What is Missing?

- You cannot build intelligent systems using only Fieldbus solutions
- This is because Fieldbuses are missing the higher-level tools to design and build model systems from networks of intelligent devices.



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IEC 61499 Rationale

- “Advances in hardware and fieldbus communication have brought modern industrial automation systems to the point where developers found modeling and development to be too complex to be solved with existing tools.”

- Hussain, T; Frey, G.: Developing IEC 61499 Compliant Distributed Systems with Network Enabled Controllers. Proceeding of the 2004 IEEE Conference on Robotics, Automation and Mechatronics, RAM-2004, Singapore, pp 613-618, Dec. 2004





IEC 61499 Rationale

- IEC 61499 evolved principally to provide a generic distributed modeling platform to simplify modeling of distributed systems and to diminish differences between business system and industrial system software modeling.

- Hussain, T; Frey, G.: Developing IEC 61499 Compliant Distributed Systems with Network Enabled Controllers. Proceeding of the 2004 IEEE Conference on Robotics, Automation and Mechatronics, RAM-2004, Singapore, pp 613-618, Dec. 2004





The Missing Link

- IEC 61499 concepts are the “missing link” and work with all Fieldbus solutions
- IEC 61499 concepts are the basis for the design and modeling of intelligent systems built from networks of intelligent devices



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IEC 61499 & Fieldbus

- Each decentralized field device provides a resource that is capable of executing IEC 61499 Function Blocks (FBs)
 - FB's may be built-in, or
 - FB's may be programmed in
- Control applications
 - created by configuring the software links between Fieldbus devices and possibly other intelligent devices (PLC's, HMI's, etc.).
 - small applications may be configured with Fieldbus devices only (no main controller)





Some Advantages

- By Using IEC 61499:
 - The logical connections between function blocks within the field devices are de-coupled from the physical location of the instruments
 - Timing relationships between be defined
 - Elements of the system can run concurrently if there are no inter-dependencies
 - Can build on the work on intelligent control using IEC 61499 (reconfiguration, etc.)



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