

DACHSview, a visual programming environment and target for event-driven real-time applications with IEC61499 processing

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ABSTRACT

The IEC61131-3 programming model doesn't meet the requirements for real-time and distributed applications, therefore was defined a new standard for the next generation of visual programming. This presentation will show which steps are necessary for modifying an IEC61131-3 Target in order to make it compliant to the upcoming IEC61499 standard. It will be demonstrated our migration of an IEC61131-3 environment to a RTOS based visual programming environment for event-driven and cyclic real-time applications as requested also by the IEC61499 standard.

Targets of the IEC61131-3 environment have a cyclic processing model, that means IEC61131-3 applications are polling for the recognition of events. It's not possible to use blocking function blocks which are waiting suspended for events. That's the reason why the IEC61131-3 standard can only be used limited for real-time applications as well as for IEC61499 applications. The upcoming IEC61499 standard combines both, the event-oriented processing and the processing model of IEC61131-3.

The target of the visual programming tool DACHSview allows to mix cyclic and event-driven processing. It's the first visual programming tool which supports programming of event-driven real-time applications in function block representation. The application code of such applications will be downloaded to the multithreaded real-time target. The DACHSview target has been modified in order to allow the integration of fully event-driven threads (system level) and cyclic threads in a single application.

In the workbench has been implemented a special library of low level function blocks of real-time services for interprocess communication by message passing, buffer management, access to physical memory, access to IO addresses and ISA as well as PCI devices. Message passing function blocks allow the communication with processes outside of the real-time target, that means it is possible to write proxy function blocks for functions provided by external processes (fieldbus masters e.g.). For the DACHSview workbench are also implemented a lot of libraries which provide function blocks for arithmetic, binary signal processing, buttons, input of numeric and textual parameters for online parametrization, PID controllers as well as visualization function blocks as LEDs or complex history graphs. All of these features make the DACHSview real-time target ideal for IEC61499 applications. The real-time applications can interface issues from the hardware-level up to visualization tasks. It's all available and will be demonstrated within the presentation.

Our next steps of this bottom-up approach will be further developments for establishing the DACHSview workbench as an IEC61499 compliant development tool for high performance class 2 IEC61499 control units supported by the DACHSview real-time target. See the results at the SoftSympo '05 in Finland ...