ABSTRACT

• NDS is the framework chosen by ITER to develop software device drivers of the hardware used for Diagnostics and I&C systems and simplify the integration in EPCIS or other software applications.
• ITER RTF will be used to implement control algorithms that will require data from ITER plants.
• Devices drivers must be integrated in ITER RTF to provide inputs for control algorithms and allow real-time control of actuators.

• Without NDS integration in RTF, the same device will have potentially two different device drivers, one for NDS-EPICS and one for RTF.
• This work aims to integrate data acquisition devices in RTF applications by configuration, without requiring block development.

BACKGROUND

ITER Nominal Device Support (NDS)

• NDS framework serves to integrate Data Acquisition and timing devices in control systems in a “standardized” manner to provide homogeneous control of heterogeneous systems.
• In NDS, Device drivers are abstracted from the control system by standardized interface, allowing a single Device Driver to be used from different control systems.
• NDS drivers are a set of nodes where each node maps to a hardware functional block.
• Hardware functions, parameters, inputs, and outputs are mapped into process variables known as NDS PVs.
• Several PXI/e and MTCA devices already count with NDS integration.

ITER Real Time Framework (RTF)

• ITER RTF is a flexible high-performance software for complex real-time algorithm execution and real-time control of actuator systems.
• Data acquisition devices must provide input for the real-time algorithms.
• RTF applications are a set of interconnected functional blocks
• Blocks can be distributed among threads.
• Blocks can be configured asynchronously, but inputs and outputs are synchronized by the RTF thread scheduler.
• RTF provides logging, archiving, and Life Cycle Management services.
• These services are accessible by all the blocks.

IMPLEMENTATION

• An RTF service will act as NDS-Control System, acting as a factory to create the NDS Drivers
• RTF blocks will be used for NDS nodes
• A first implementation maps manually RTF blocks with NDS nodes
• Future work will propose tools for automatic code generation.
• NDS service and blocks are provided as RTF plugin

CONCLUSION

➢ Integration of NDS in RTF will allow component reuse
  • Increased maintainability
  • Reduced development effort
➢ Data acquisition devices serve as data sources for real-time control algorithms
➢ Device drivers will be integrated with configuration, not with development.

ACKNOWLEDGEMENTS

This work was supported in part by the Spanish Ministry of Economy and Competitiveness, Projects Nº ENE2015-64914-C3-3-R and Madrid regional government (YEI fund), Grant Nº PEJD-2018-PRE/TIC-8571.