

Integration of data acquisition devices in the ITER Real-Time Framework using Nominal Device Support

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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.

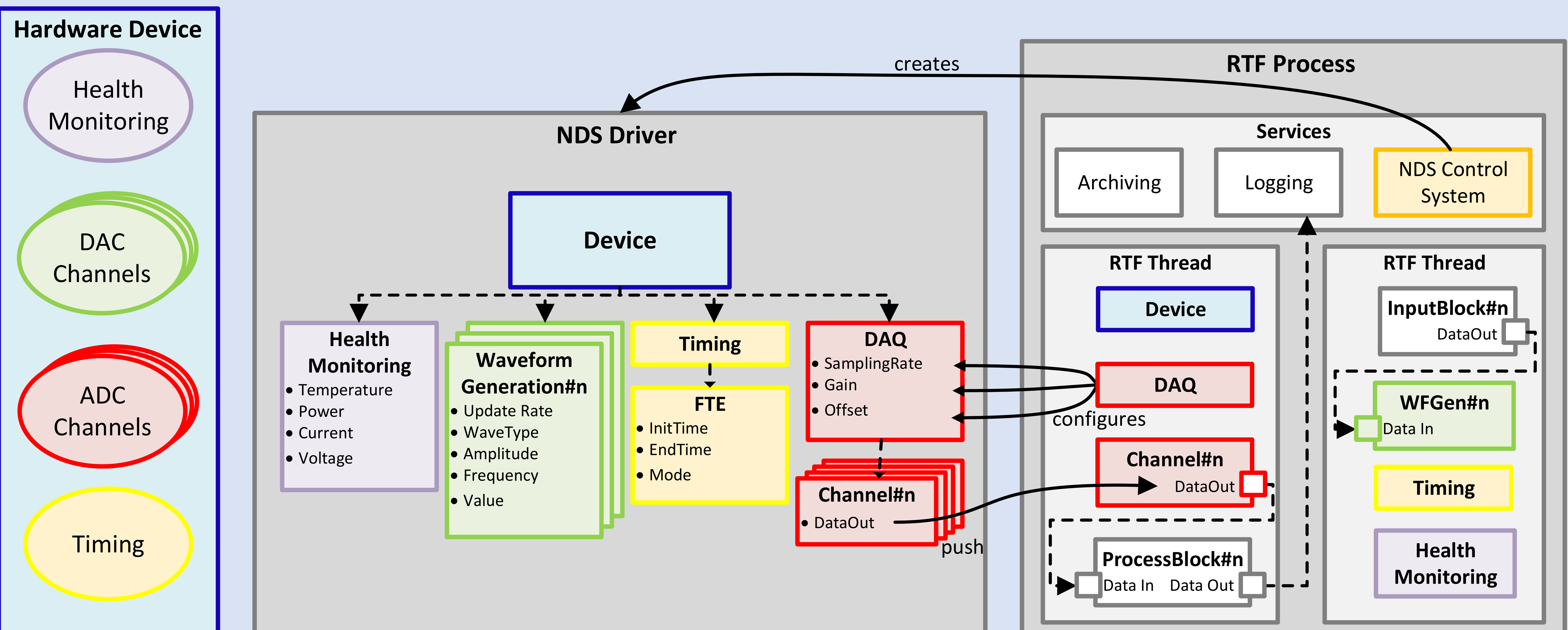
BACKGROUND

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

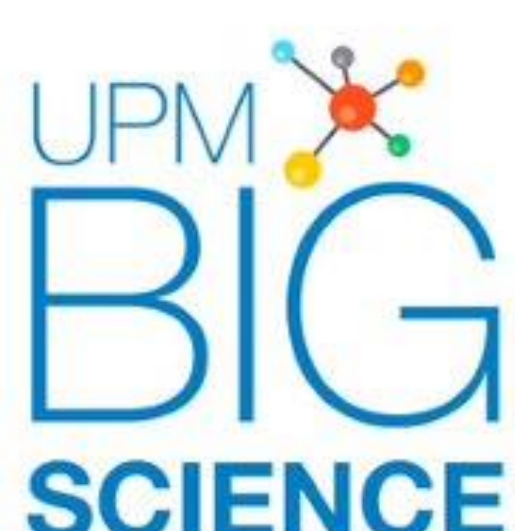
- Integration of NDS in RTF will allow component reuse
 - Increased maintainability
 - Reduced development effort
- Data acquisition devices serve as data sources for real-time control algorithms
- Device drivers will be integrated with configuration, not with development.

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