

# Metadata framework for distributed real-time control systems

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Modern real-time plasma control systems will be modular and distributed. This provides several advantages: component isolation, component simplicity and robustness, scalability, and the possibility of utilizing heterogeneous execution environments. In addition these systems are amenable to machine learned pipelines. However such systems incur the liabilities of system complexity and communication related delays and jitter.

We have developed a framework for describing the components of distributed modular control systems. It specifies a schema for describing the interfaces between components, the components or function blocks, and the deployment of the resulting real-time actors on computers running a real-time framework. The solution is framework agnostic. It can generate artifacts to drive particular chosen real-time frameworks.

Using the framework we describe the components of the control system for a demonstration device, generate artifacts for the SCDDS real-time system developed for TCV, implement controllers using these artifacts, and finally deploy them to operate the device. This meta data framework is applicable to modular simulation environments.

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