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## New developments in the FairRoot framework

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The FairRoot framework is the standard framework for simulation, reconstruction and data analysis developed at GSI for the future experiments at the FAIR facility.

The framework delivers base functionality for simulation, i.e.: Infrastructure to easily implement a set of detectors, fields, and event generators. Moreover, the framework decouples the user code (e.g.: Geometry description, detector response, etc.) completely from the used MC engine. The framework also handles the Input/Output (IO). The output of single detectors (tasks) can be switched on (made persistence) or off (transient) in a simple and flexible way.

For reconstruction and/or data analysis the user code is organized in modular tasks that implement the different states of a state machine. The order in which these tasks are executed is defined via a so-called steering macro. This scheme allows a very flexible handling of the reconstruction and data analysis configurations, it also allow for mixing of simulation and data reconstruction. Reconstruction tasks can run separately after simulation or directly on the fly within the simulation.

The modular design of the framework has allowed a smooth transition to a message queue based system, which makes it possible to parallelize the execution of the tasks without re-designing or re-writing the existing user code. The new design also allows implementing the processes in different programming languages or on different hardware platforms. For the communication between the different processes modern technologies like protocol buffers and Boost serialization are also used.

The framework with a focus on the basic building blocks and the transition to the message queue based system will be presented.

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