

An Artdaq Overview

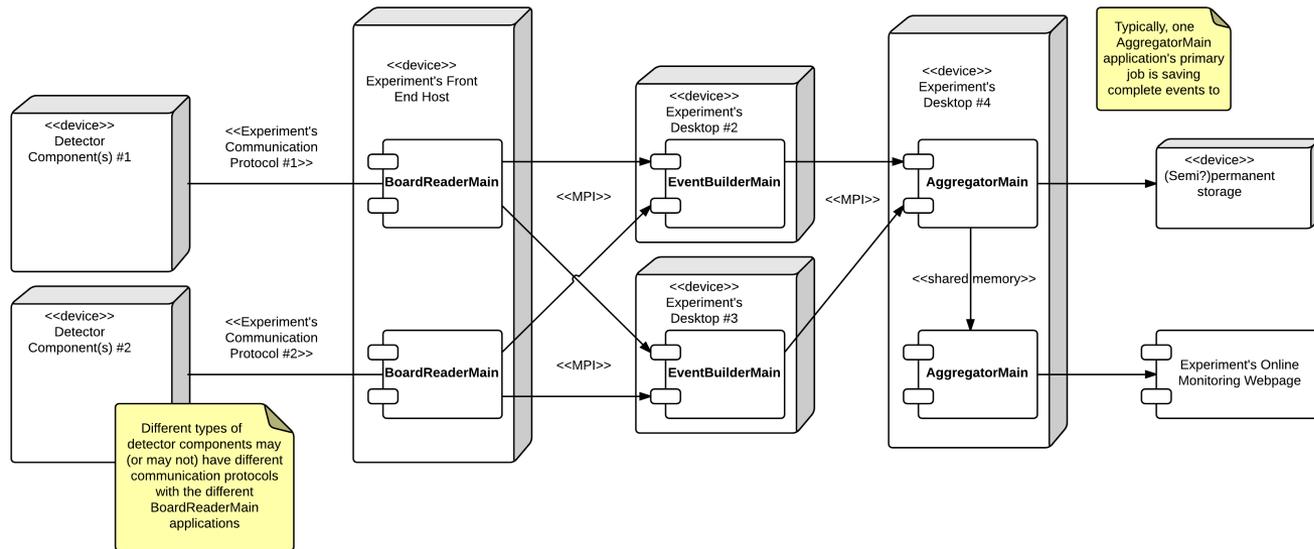
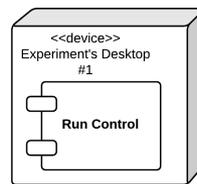
John Freeman, for the RSI Group, 10/14/14

What is artdaq?

- A set of applications running extensible software components which can be customized by experimenters to create a functioning DAQ system
- Without having to write a DAQ system from the ground up, physicists can play the role of physicists rather than software engineers
- Currently used in the Lariat, DarkSide-50, LBNE and mu2e experiments; partial use in Nova
- Three core application types, capable of running on different hosts: BoardReaderMain, EventBuilderMain and AggregatorMain

Sample artdaq-based DAQ system
UML Deployment Diagram
J. Freeman, 10/13/14

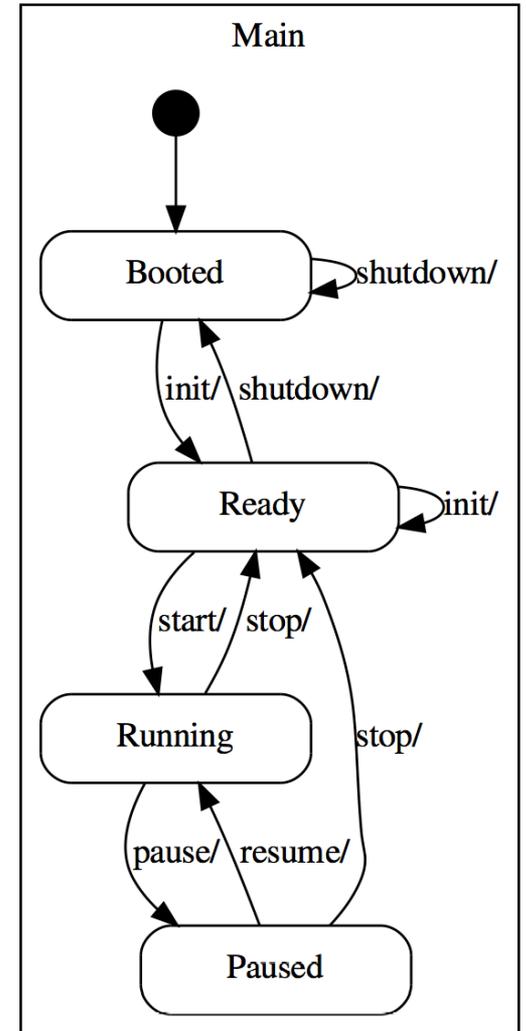
Run Control, supplied by the experiment, communicates with the artdaq processes via XML-RPC (connections not explicitly shown)



- BoardReaderMain packages detector data into “artdaq Fragments” w/ unique event and detector component IDs
- EventBuilderMain assembles the Fragments into complete events
- AggregatorMain writes events to disk, makes online monitoring plots, etc.

As a State Machine

- Artdaq-based DAQ systems are state machines; each artdaq process will respond to transition commands sent to it via Run Control
- Also supplied, though not shown: a “status” command, allowing one to query the state of the DAQ



The Experimenter's Role

- BoardReaderMain does not know the details of an experiment's hardware; user needs to define what happens with that hardware when the “initialize”, etc., transitions are sent
- Both EventBuilderMain and AggregatorMain are capable of employing user-supplied Art modules, used for event filtering, analysis, etc.
- On initialization, recompilation is not needed in order to change parameters controlling Art modules or user's embedded code in BoardReaderMain
 - User even has option of dropping/adding Art modules

Wrapping Up

- Lots of people have put work into artdaq over the last couple of years
- To learn more, a package, artdaq-demo, allows users to get a toy artdaq-based DAQ system up-and-running from scratch in about 10 minutes (
<https://cdcvs.fnal.gov/redmine/projects/artdaq-demo/wiki>)
- Extensive documentation, from beginner to expert, also supplied on this website