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Status of the OTSDAQ development

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Introduction

- The Fermilab Scientific Computing Division is developing a generic data acquisition system called Off The Shelf (OTSDAQ) for experiments, test stands, test beams…

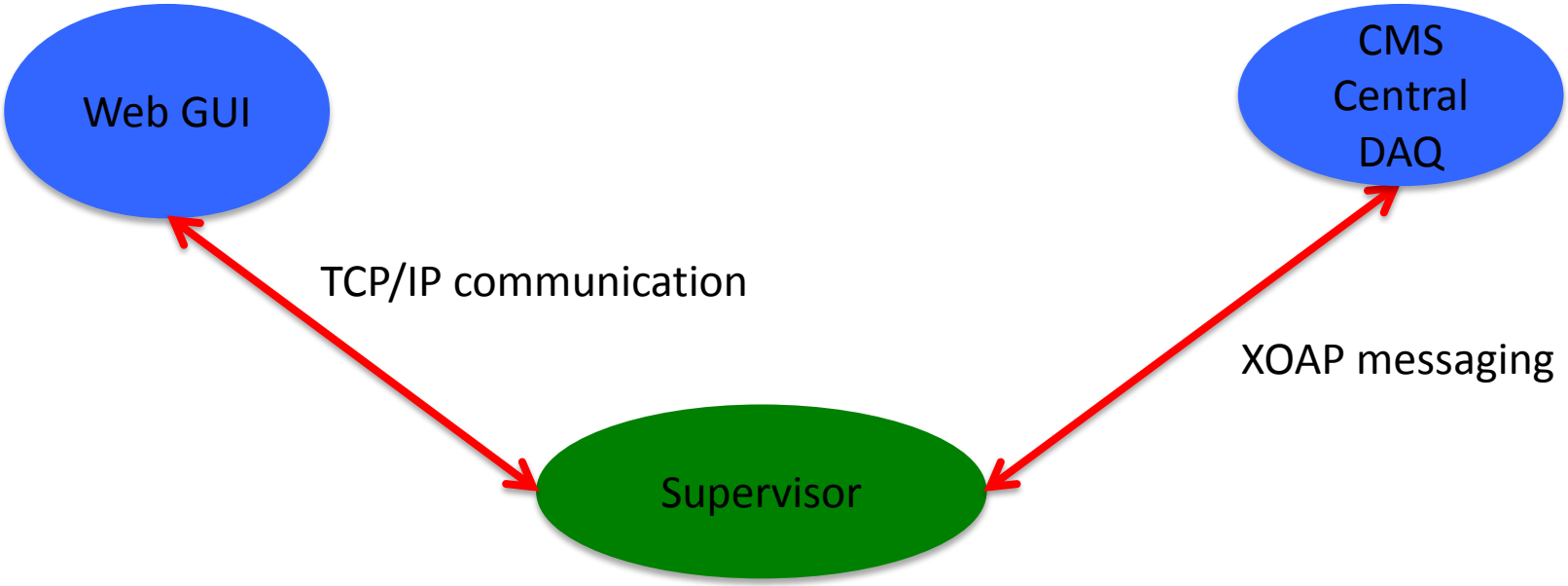
- The idea is to have a generic software that allows users to quickly integrate their hardware in an existing framework, OTS, without spending too much resources to develop a complicated DAQ software

- The OTS DAQ is based on some existing frameworks:
  - XDAQ -> the CMS DAQ framework
  - ARTDAQ -> a DAQ based on ART which is a branch of CMSSW

- Users are provided with many basic functionalities that they can use if they want, like for example UDP networking classes, or they can implement their own classes to communicate to the hardware

- The project is hosted in the Fermilab Redmine repository:
  https://cdcvs.fnal.gov/redmine/projects/otsdaq/wiki

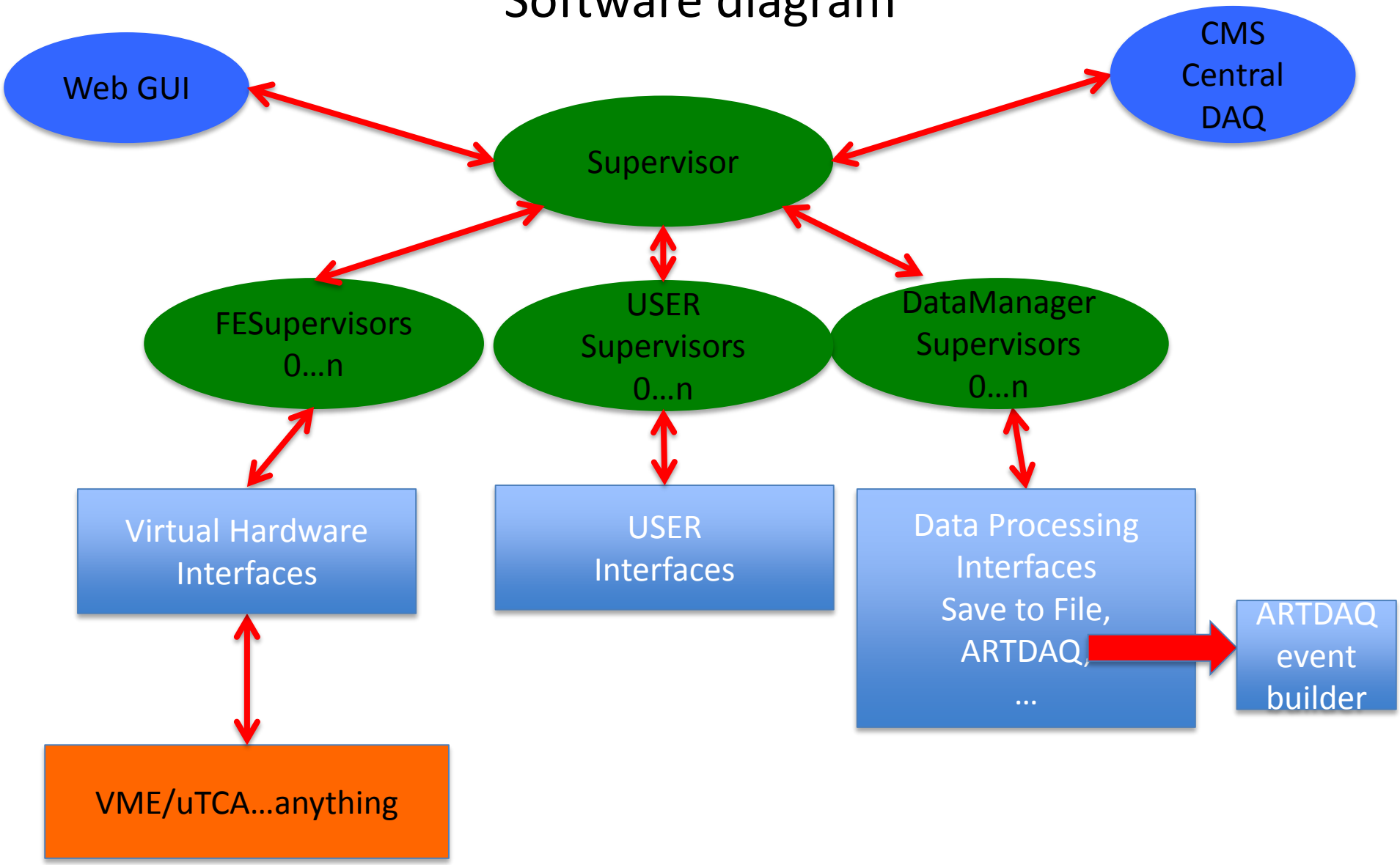
XDAQ based software



- The Supervisor is a XDAQ application.
  - A XDAQ application is a web server
  - It can send/receive XOAP messages

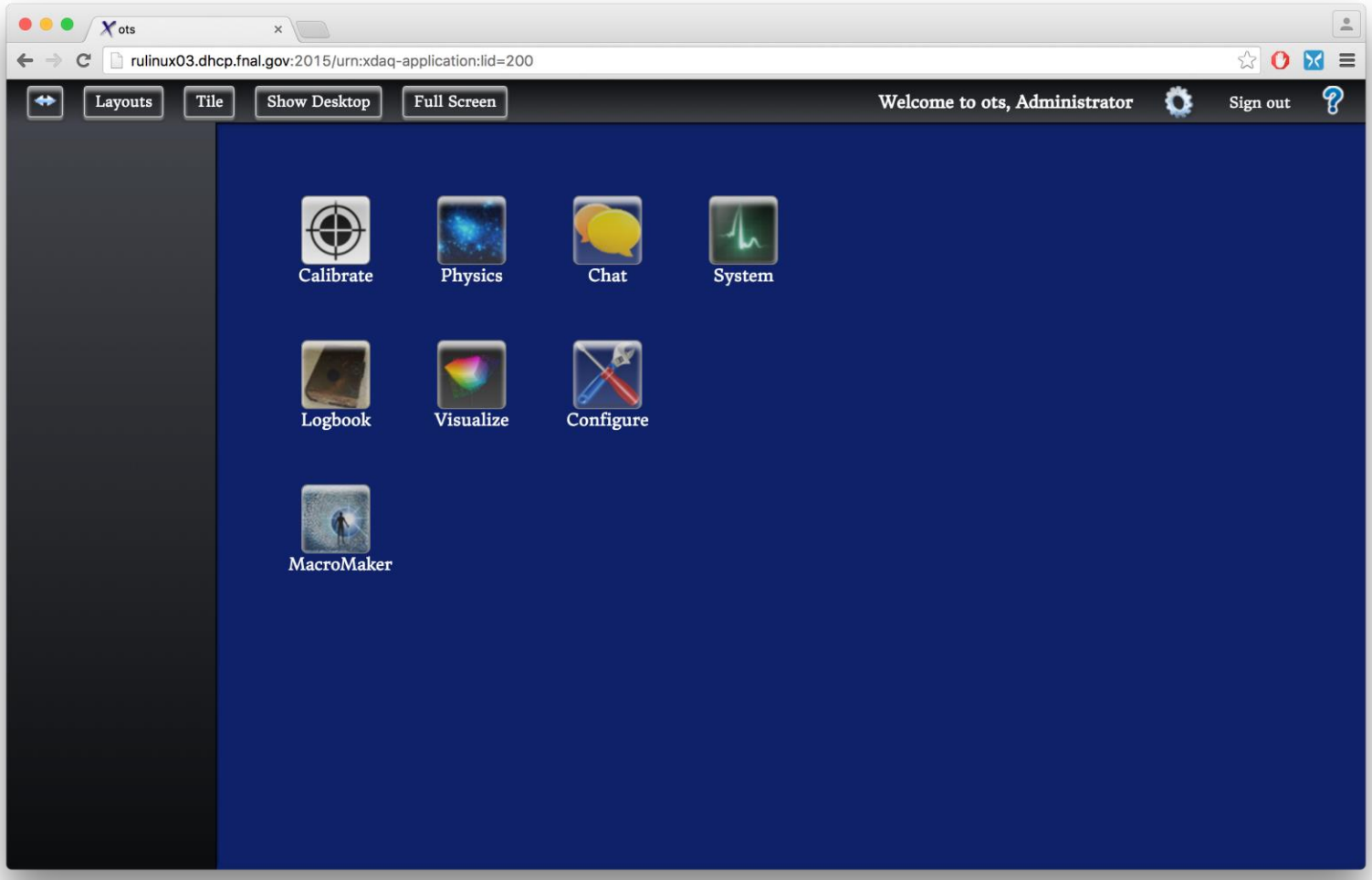
- The Supervisor is the only point of communication with any controller, Web GUI or CMS Central DAQ, converting all TCP/IP communication into XOAP messages and retransmitting them to make sure that its behavior will be the expected one when it is controlled with XOAP messages only.

Software diagram



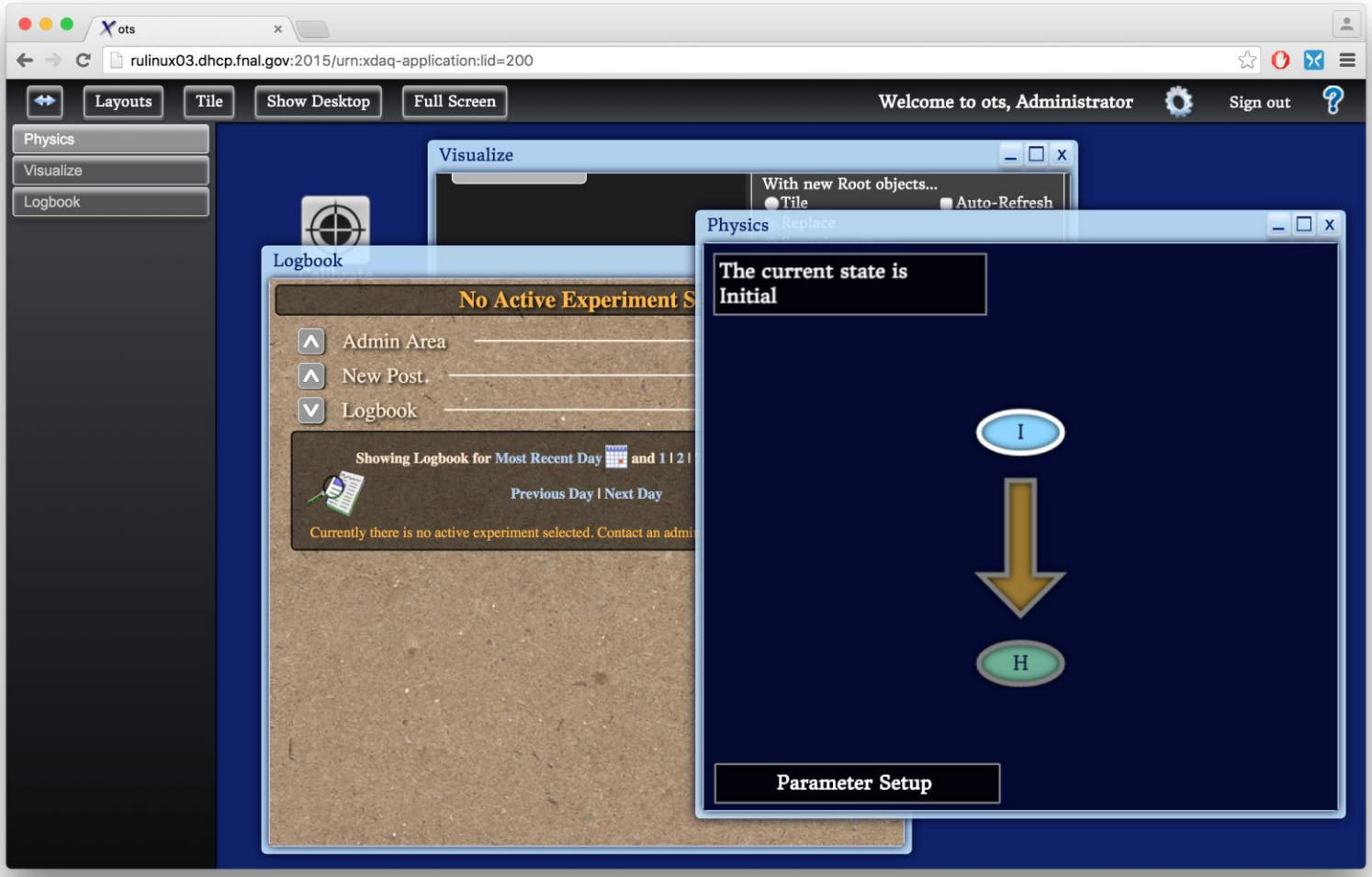
Run Control GUI

- The GUI is written in HTML5 and Javascript
- It is designed as a desktop with icons corresponding to XDAQ applications providing services to facilitate the use and monitor the status of the system.



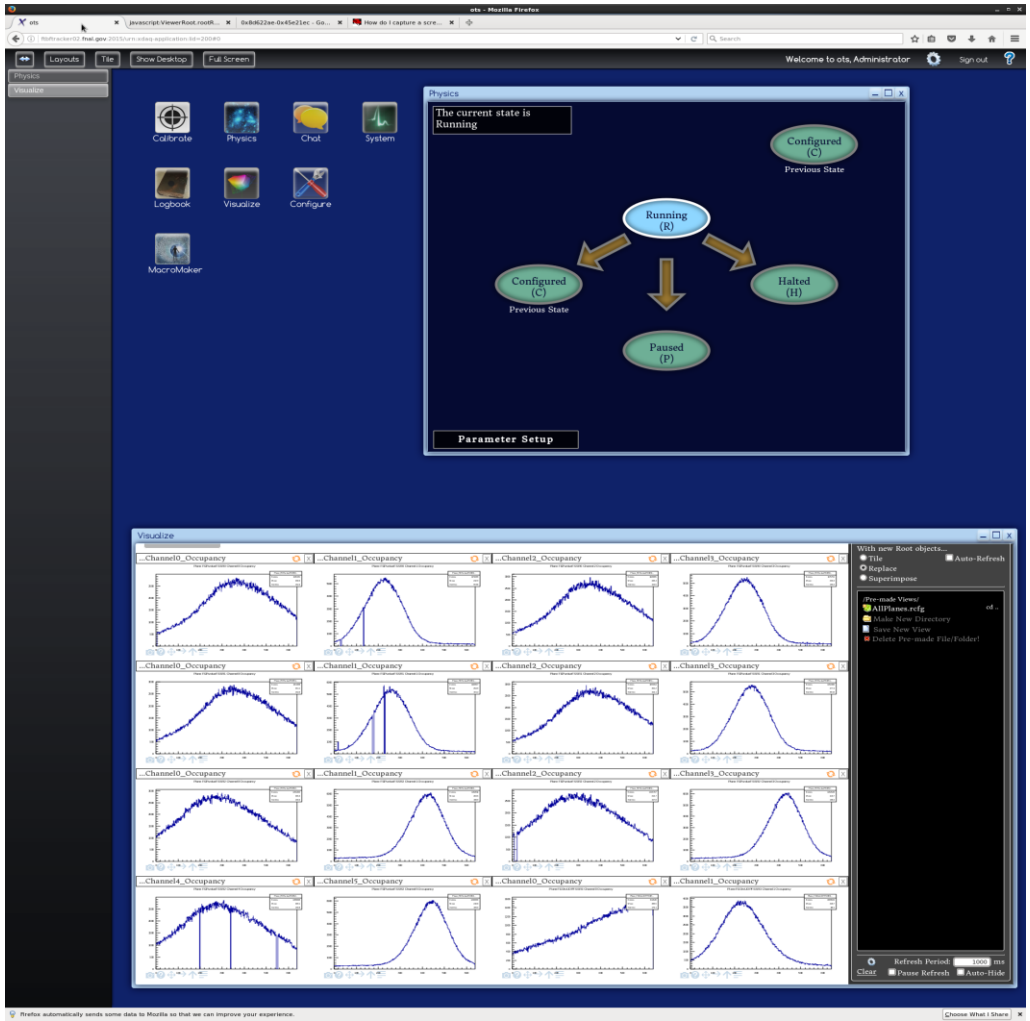
Run Control GUI

- State Machine controller
- Logbook
- DQM visualizer
- …and more



Run Control GUI

- OTSDAQ is already in use at the Fermilab Test Beam Facility where it is used to control the facility silicon strip telescope.
- The visualizer is also written in Javascript and uses the JSROOT libraries



Middleware and OTSDAQ integration

- The Software is organized in subdirectories and we organized all the outer tracker code into a separate repository that need to be extracted in parallel to otsdaq:https://cdcvs.fnal.gov/redmine/projects/cmsoutertracker/wiki

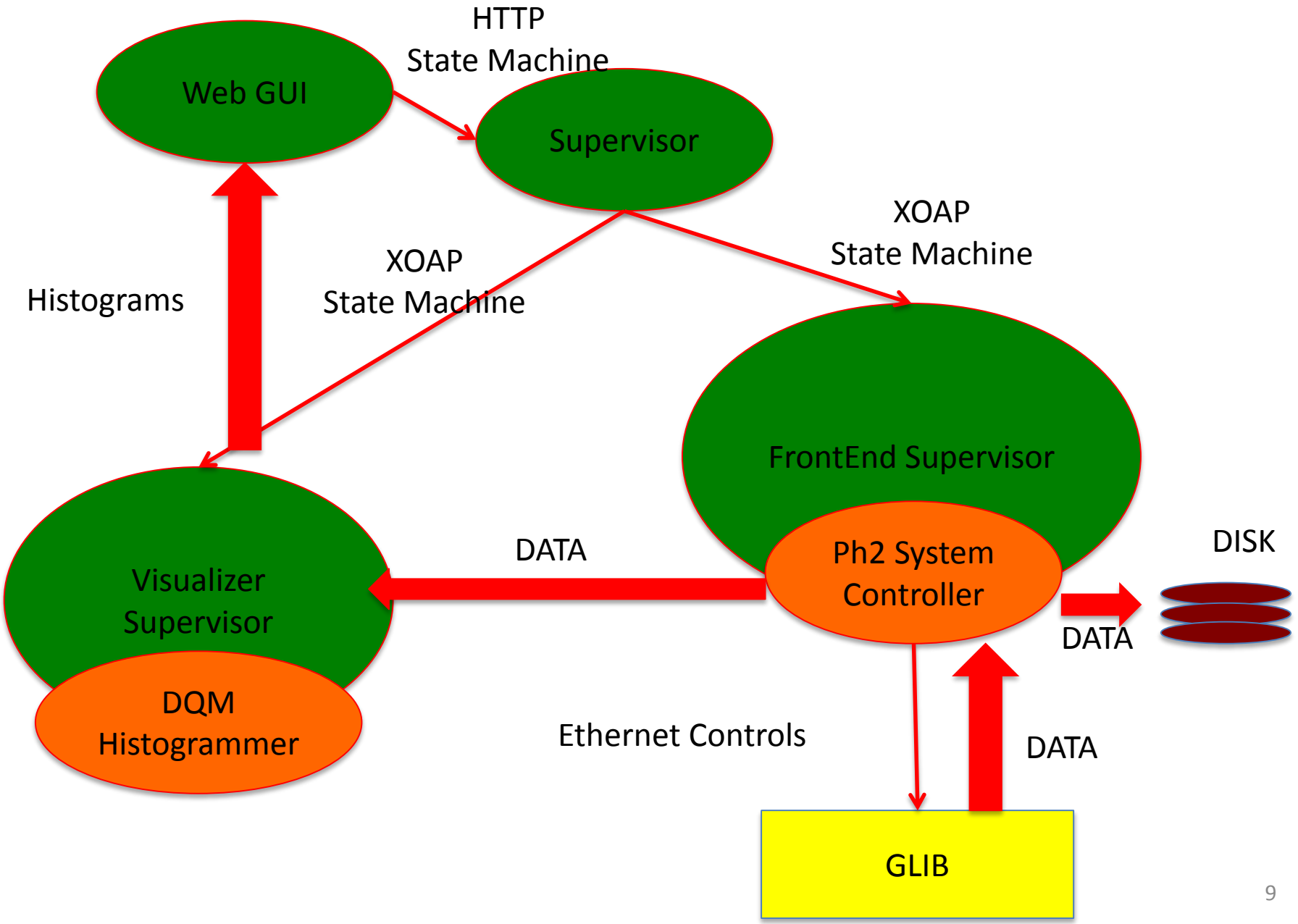
- For a quick integration and proof of concept we incorporated uHAL and the Ph2_ACF software in the outer tracker repository too (it is easy to merge them with their respective repositories in case of updates)

- Our OtsDAQ framework instantiate a set of supervisors and, in particular, we have a so called Front End Supervisor that controls, receiving XOAP messages, the CBC specific Front End Interface

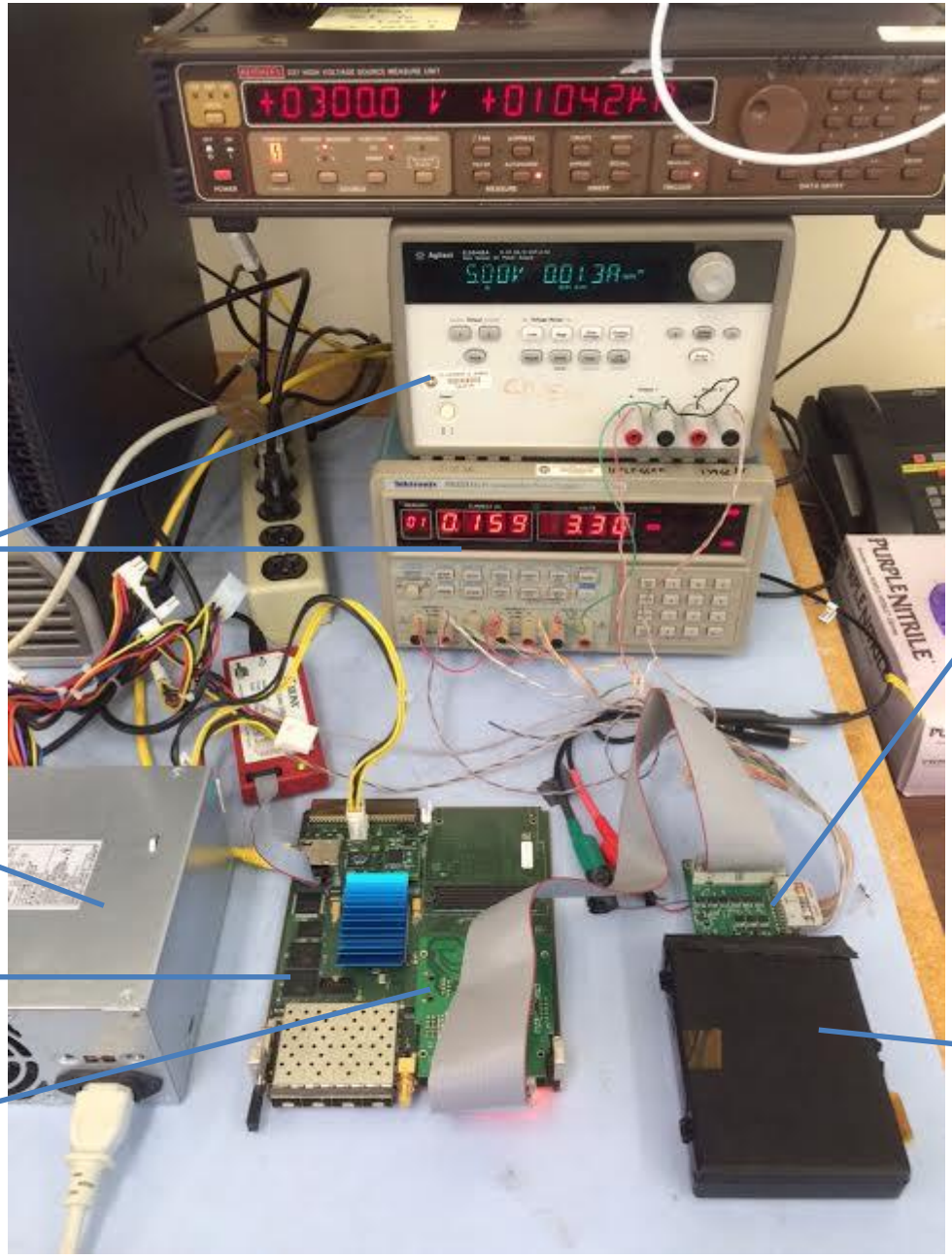
- We made a new interface class called “FECBCInterface” and adapted the methods from the miniDAQ in Ph2_ACF

- In the last few weeks we actually cloned the Ph2_ACF git repository in gitlab and use it as a submodule of our outer tracker repository. When we’ll have a stable release we’ll ask for a merge request with the official Ph2_ACF repository.

OTSDAQ and Ph2_ACF



Fermilab 2S setup



Power sources for hybrid board and adapter

Power for GLIB

GLIB board

FMC board

2-chip adapter card

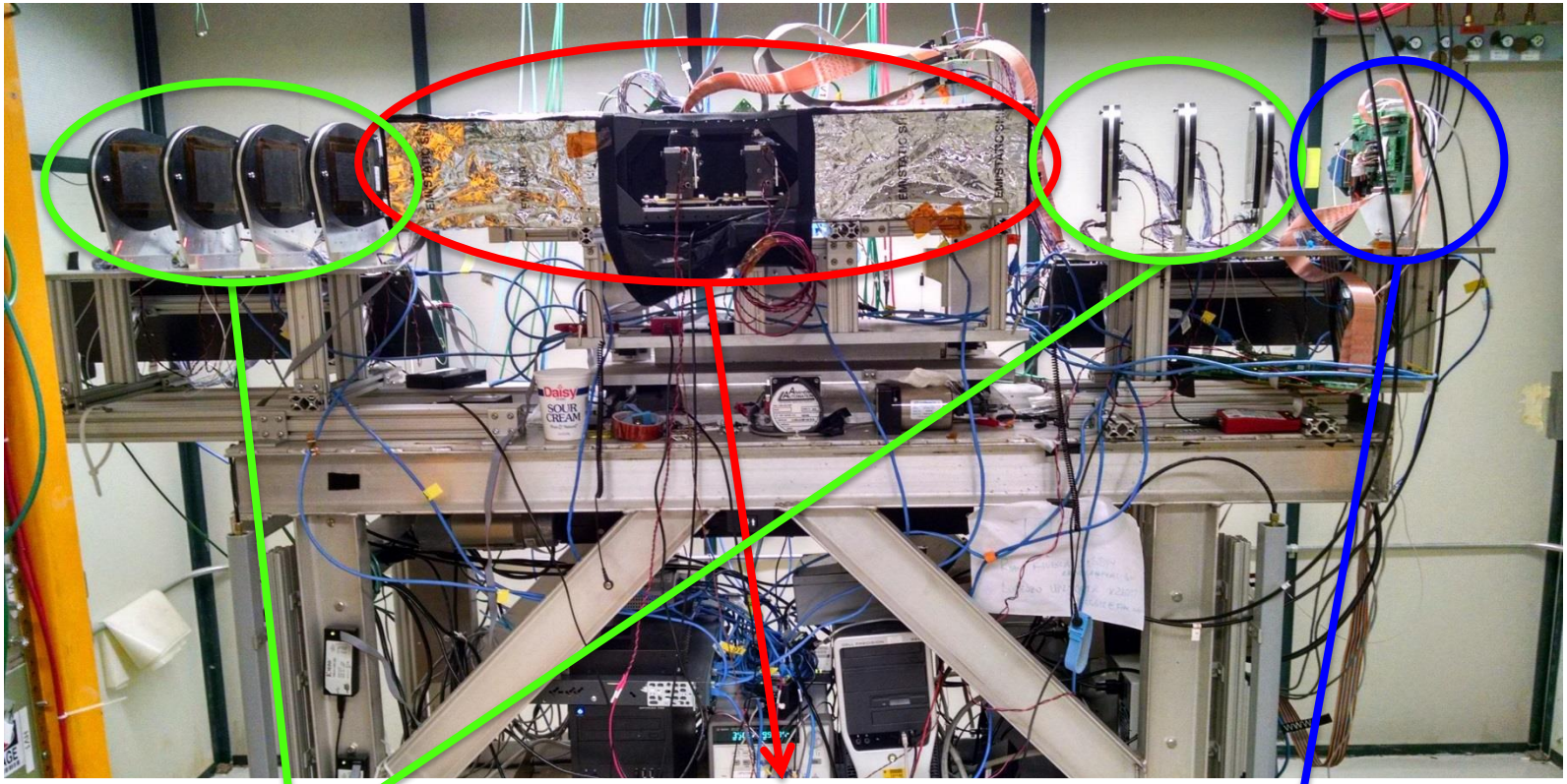
2S chip hybrid module

Deployment

- We are testing all the integration steps using the setup in the previous slide
- We were able to integrate the middleware in OTSDAQ just before the October test beam at CERN.
- We could test it just before the end of the test beam and we found out a problem when saving and visualizing events
- During the past summer we have also integrated OTSDAQ with the MAPSA readout converting the python code written by Rutgers to C++
- Recently Rutgers converted all their software in the middleware framework and we were also able to merge their code, which is also in gitlab, in the OTSDAQ framework
- Right now we are having a test beam here at Fermilab where we want to take data with the Rutgers middleware version for the MAPSA, integrated in OTSDAQ and the facility strip telescope.

Fermilab test beam setup

- The goal is to integrate in OTSDAQ the strip telescope, already read out by OTSDAQ, with the MAPSA middleware.



Conclusions

- We have integrated the middleware in OTSDAQ
- The system can be used in test beams, test stands and, since it is based on XDAQ, it can easily scale up to the full detector
- XDAQ is easily configurable and can easily scale from a small set of “Supervisors” to any large number
- The GUI is already in an advanced state of development and will improve, according to the calibrations’ needs, to facilitate debugging during and test stand operations
- We are working on fixing some bugs and have a stable release that we are hoping to deploy in the next few days to be able to take data here at Fermilab with the MAPSA