Pixel Online Software

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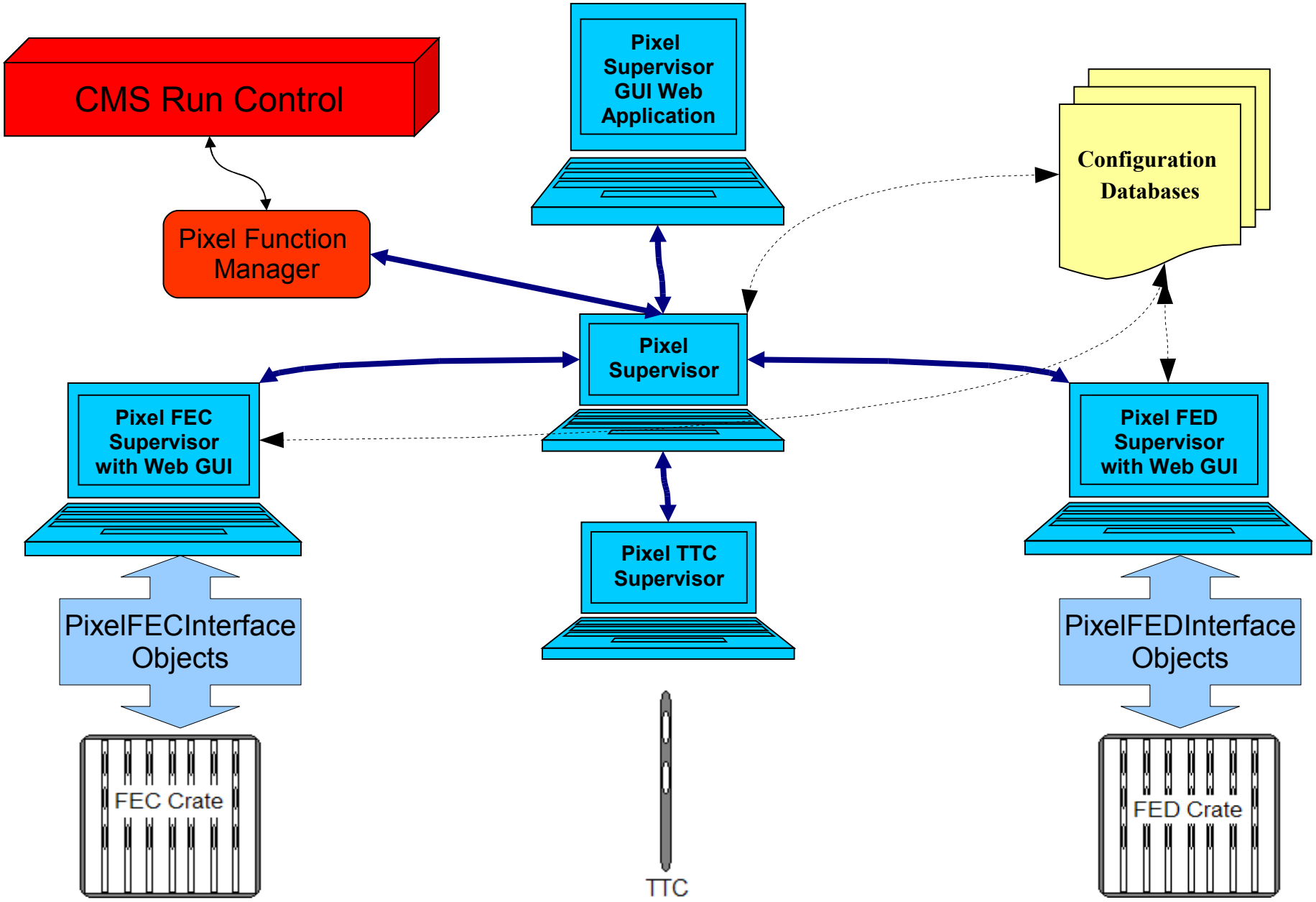
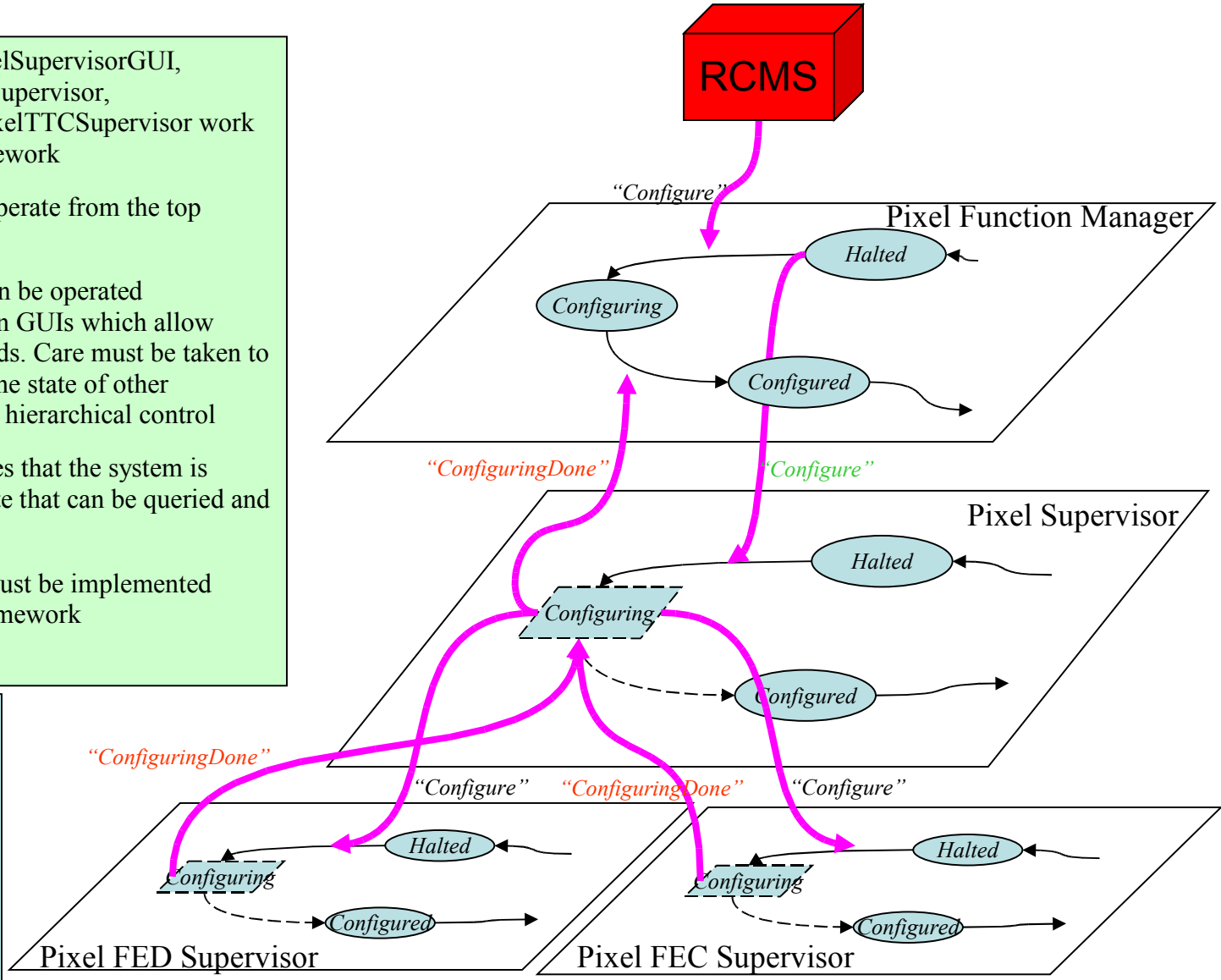
Overview of Present Pixel Online Software



Layers of State Machines

- PixelFunctionManager, PixelSupervisorGUI, PixelSupervisor, PixelFEDSupervisor, PixelFECSupervisor and PixelTTCSupervisor work within a state machine framework
- Hierarchically arranged to operate from the top (PixelFunctionManaer)
- However each supervisor can be operated independently with their own GUIs which allow access to low level commands. Care must be taken to restore its state machine to the state of other supervisors before resuming hierarchical control
- Why state machines? Ensures that the system is always in a well-defined state that can be queried and recovered
- All calibration algorithms must be implemented within the state machine framework



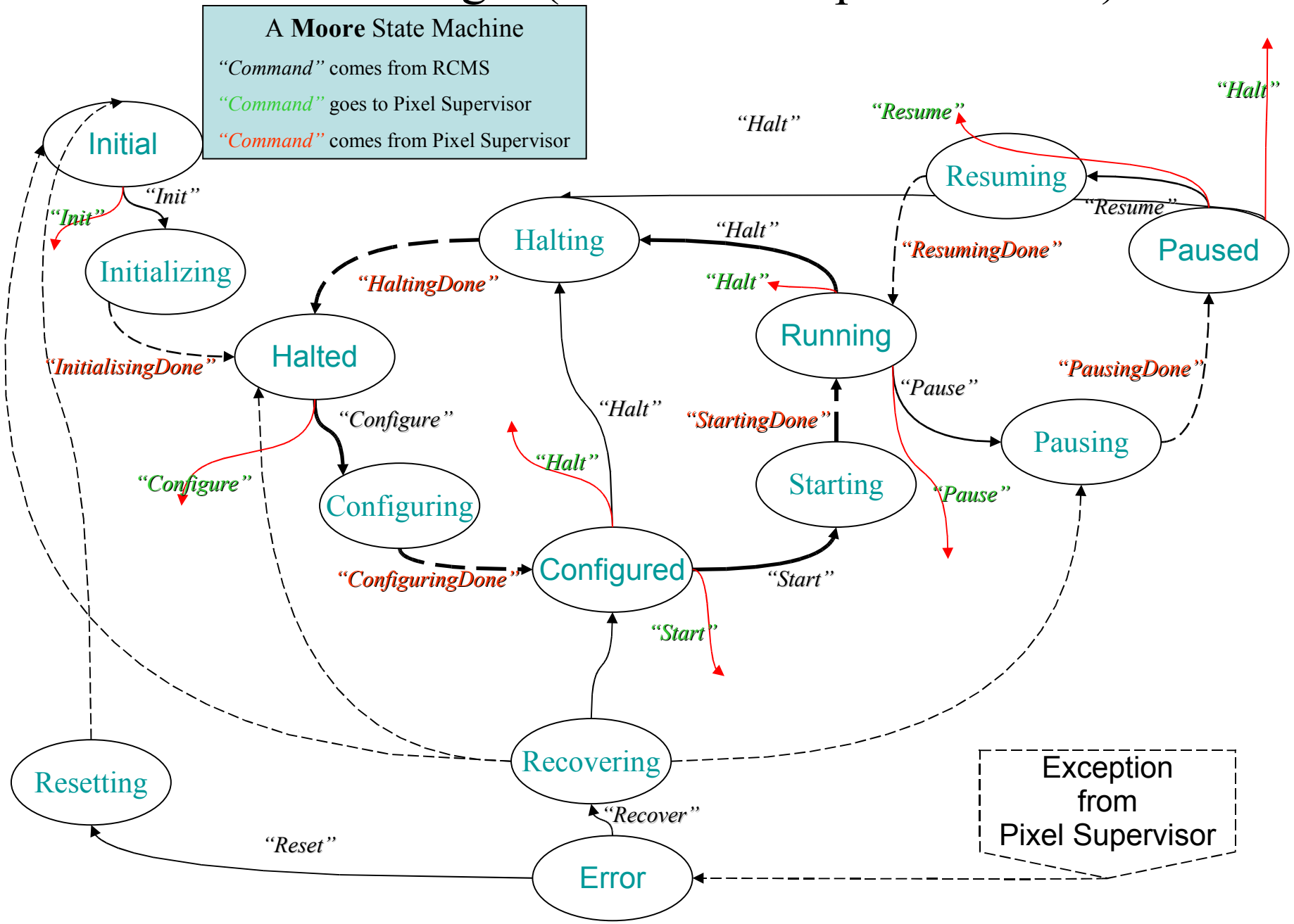
Legend

SOAP message

Configuring — State

Configuring — Transition (Entry) Function

Function Manager (Also PixelSupervisorGUI)



HyperDAQ

http://mp72.lns.cornell.edu:1973
urn:xdaq-application:service=hyperdaq


Control Panel

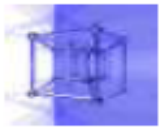

Cluster Explore


Executive
urn:xdaq-application:ser


XRelay


PeerTransportHT[...]
pplication:lid=1


PeerTransportFi[...]
urn:xdaq-application:lid=


HyperDAQ
urn:xdaq-application:ser


PixelSupervisor
ication:lid=


PixelSupervisor[...]
urn:xdaq-application:lid=


PixelTKFECSuper[...]
urn:xdaq-application:lid=55


PixelFECSupervi[...]
urn:xdaq-application:lid=


PixelFEDSupervi[...]
urn:xdaq-application:lid=


PixelLTCSupervi[...]
urn:xdaq-application:lid=

PixelTTCSupervi[...]
urn:xdaq-application:lid=


PixelDCSSupervi[...]
urn:xdaq-application:lid=100

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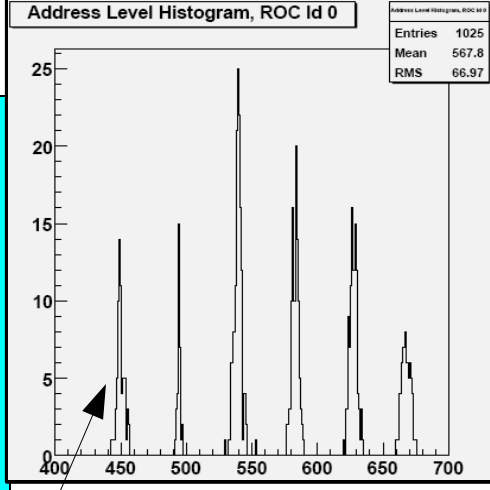
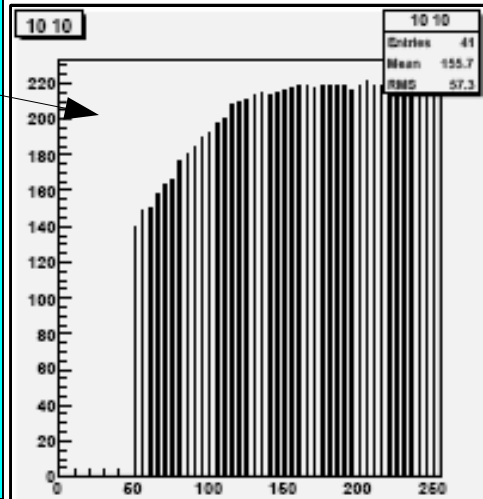
Major Steps So Far

- Can communicate with the FED, FEC and TTC boards using XDAQ.
- We have implemented the layered state machine structure of Supervisors.
- Each Supervisor has its independent GUI for low level control.
- We have a working file based system of storing configuration and calibration information.
- Can peform some basic calibrations on the pixel detector:
  - **FED Baseline Calibration**: Stabilize the Black level of TBM output using FED's knobs
  - **FED Address Level Calibration**: Collect statistics of signal levels from TBM for setting threshold levels in the state-machine decoder inside the FED.
  - **Pixel Alive Test**: Which pixels in our detector are alive?
  - **Gain Calibration** (Data taking): ADC vs Vcal curve
  - **S-Curve Calibration** (Data taking): Fraction of responding pixels vs Vcal
- Tested on the '07 detector at Fermilab
- Tested on the Cornell Test Stand
- Drafted a manual. Available at http://pages.physics.cornell.edu/~souvik/CMS/PixelOnlineSoftwareManual.pd
- **Version 1.1.0** Release





Pixel Supervisor GUI

XDAQ **PixelSupervisorGUI**

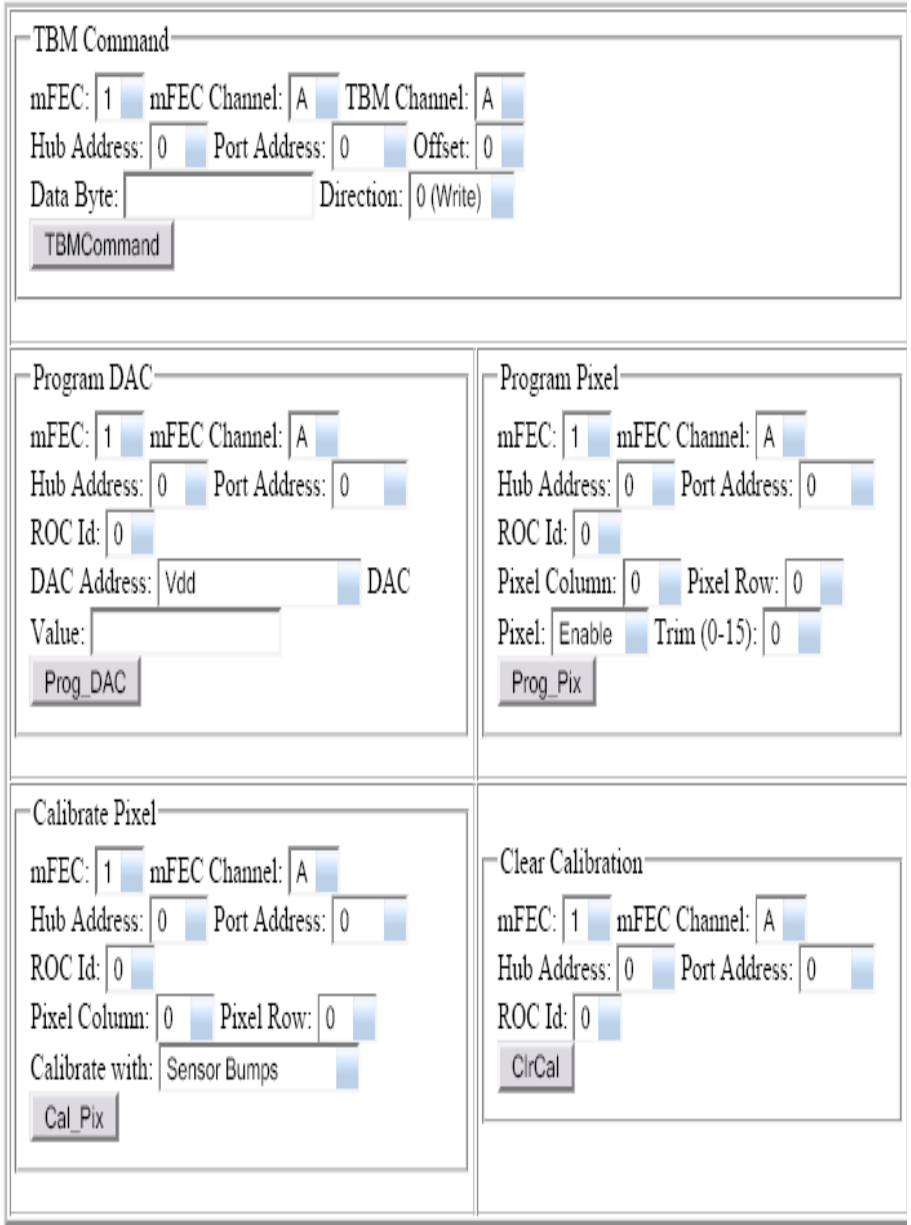
Version: 3.0
Date: Tue, 30 Jan 2007 02:03:45 GMT

Halted

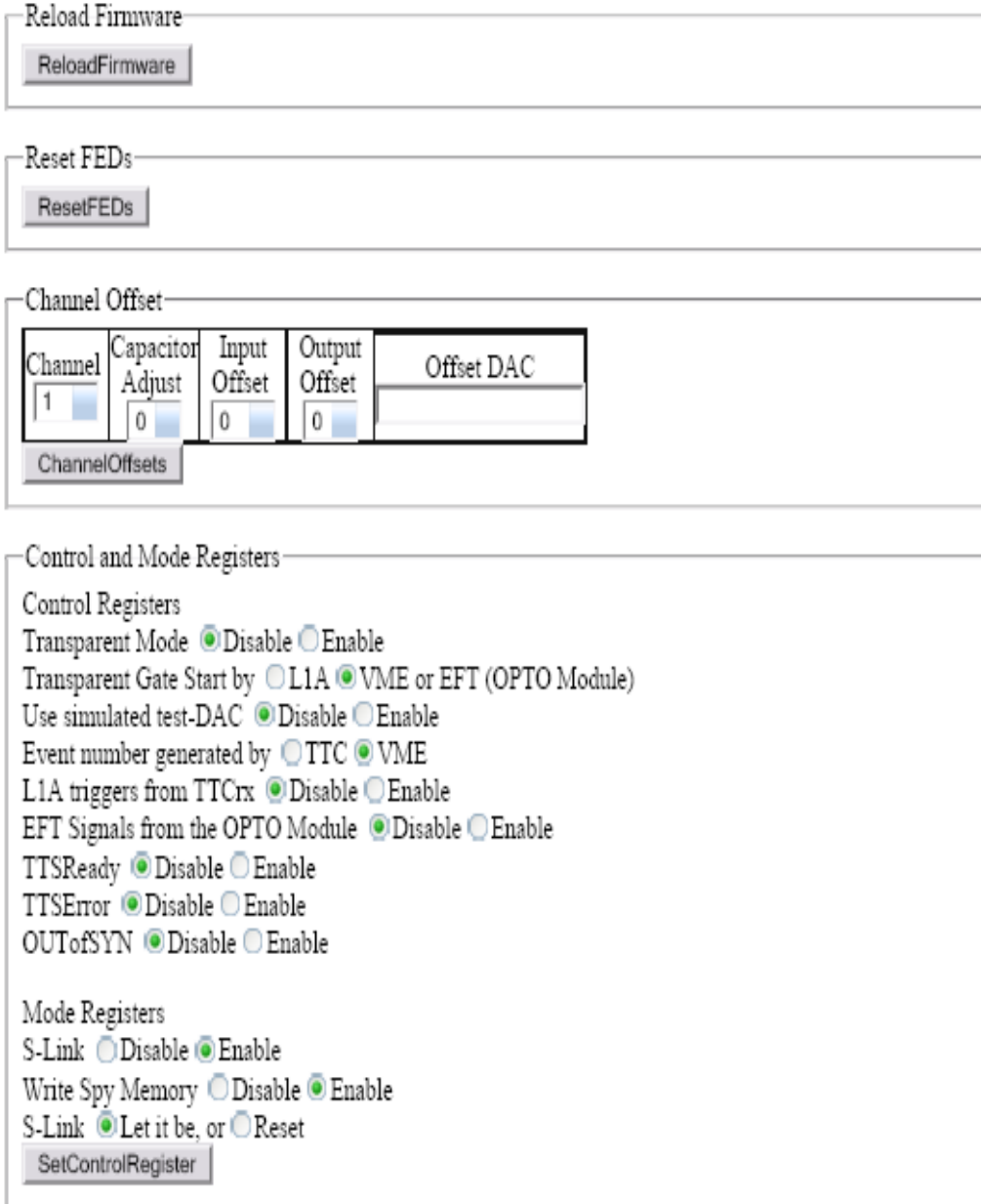
Current State Halted	◉ Calibration ○ FED Baseline Correction Using Test-DACs (Under renovation) ○ FED Address Level Calibration Using Test-DACs (Under renovation) ○ FED Baseline Correction Using Pixel Data ○ FED Address Level Calibration Using Pixel Data ○ Gain Calibration ○ Pixel Alive! ○ S-Curve ○ Clock Delay and Phase Calibration ○ Physics				
Configure	Halt	Initialise	Pause	Resume	Start

Pixel FEC/FED Supervisor GUIs

FEC with Base Address 0x30000000



FED with Base Address 0x1c000000



Beyond Version 1.1.0

- Extended code to use multiple FEC/FED crates and multiple FEC/FED boards in each crate
- Testing and improving low level GUI-s
- Cleaning up messy code, hard-coding and simplifying user's life
- Integration with Detector Control System. Last DAC temperature FIFO
- Writing of Tracker FEC Supervisor and integration with rest of Pixel Online Software
- Integration with Run Control Monitoring System
- Integration with the Trigger Throttling System of the DAQ
- Integration with the Database
- Analysis of calibration data. Integration with CMSSW
- More calibrations types:
  - UltraBlack levels for all ROCs must be close and close to TBM's UltraBlack
  - Trims calibration
  - Gain of each ROC and TBM

New Pixel FED Supervisor GUI

XDAQ *Pixel Front End Driver Supervisor*

Version: 3.0
Date: Thu, 15 Feb 2007 18:19:31 GMT

Configured

Finite State Machine

Current State Configured	Get Run Sequence from XML File:			
Configure	Halt	Pause	Resume	Start

Low Level Commands

FED with Base Address 0x1c000000: **TTS**Disconnected TTS Event = 0

FED with Base Address 0x1c000000

FED Channel 1 Offset DAC 0	
FED Channel 2 Offset DAC 100	
FED Channel 3 Offset DAC 50	
FED Channel 4 Offset DAC 171	
FED Channel 5 Offset DAC 0	
FED Channel 6 Offset DAC 0	
FED Channel 7 Offset DAC 0	
FED Channel 8 Offset DAC 50	
FED Channel 9 Offset DAC 0	

Data FIFOs Read • Spy FIFO 1 • Spy FIFO 2 Normal Mode • Spy FIFO 3 Normal Mode Ship Spy FIFO data to	Error FIFO	Temperature FIFO	ReadTTSFIFO

2/15/2007 12:15