System Setup: Run Control

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`http://www.hep.ph.qmw.ac.uk/~landon/talks`

Overview

- Run Control Overview
- Synchronisation
- State Transition Actions

Run Control (1)

Overview

- Hierarchy of run controllers
- Expect one controller per crate in our system
- Finite state machine: Initial, Loaded, Configured, Running, Paused (plus error states etc)

Synchronisation

- Parent controllers makes transition before its children
- Parent can initiate state transitions in its children either all in parallel, or in forward/reverse order
- No communication between child controllers
- Limited synchronisation possible by inserting extra levels in the run control hierarchy.
- Expect to use this in our system for the TTC

Run Control (2)

State Transitions

- Recommendations from the Online group:
- Initial→Loaded: read database, establish network connections
- Loaded→Configured: configure hardware (run type independent) and software (start threaads, processes)
- Configured→Running: run type dependent stuff

Use Case

- Boot the DAQ (with default run type)
- Move to Configured state
- Change run type to some kind of calibration
- Start, stop calibration run
- Change run type back to Physics
- Start normal run

Run Control (3)

Handling Run Types

- Run parameters, eg run type (normal or calibration) can be changed in the Configured state, so hardware settings which may depend on the run type should only be done at the transition into the Running state
- We will probably have some test run which alters any given parameter in the system
- Safest and simplest to always load (almost) everything at the transition to the Running state, ie thresholds, lookup tables, etc
- Only add complexity if performance requires it (ie we are the slowest system in ATLAS)
- Exception may be TTCrx settings: want to establish board clocks and link synchronisation earlier.
- Change TTCrx clock delays by reading existing value and moving to new value in small increments with delays to allow PLLs to catch up?

Run Control (4)

Transition Actions

- Draft “Local Controller” document
  `http://www.hep.ph.qmw.ac.uk/~landon/l1soft/docs`
- Summary of actions for each module at each transition
- NB ideas changing with successive drafts...
- Feedback welcome
- Some first thoughts on calibration scenarios

Run Control (5)

General Idea

- Initial→Loaded:
  - Read hardware configuration for crate
  - Create run time objects for modules
  - Lock resources against simultaneous use by other partitions
- Loaded→Configured:
  - FIRST: use TTC broadcast to sync LVDS links?
  - Check expected modules are actually present
  - Can load any run type independent settings into modules
- Configured→Running:
  - Load run type dependent settings into modules
  - LAST: for some calibrations, use TTC broadcast to start synchronous playback
- Periodically (maybe separate thread or process?):
  - Read status, error counts, PP rates
  - Publish in the information service

Transition Actions: PP

Transition	Actions
Initial→Loaded	Read database: – expected configuration of modules – default FPGA versions – dead/hot/disabled channel masks – energy calibrations – coarse and fine timing calibrations – BCID pulse shape calibrations – BCID/FIR/saturation settings – readout settings – default rate histogram settings – PPROD settings Lock crate/modules via Resource Mgr?
Loaded→Config	Check expected modules are present Check FPGA versions: reload and reset if required Load TTCrx settings? Assert BUSY on all PPRODs Update module status in L1Calo IS server? Start rate monitoring program/thread
Config→Running	Load all calibrations and settings into PPMs Load settings (if any) into the TCM Load readout settings and default monitoring selections into PPRODs Zero rates and/or other statistics for this run Remove BUSY from all PPRODs
Running→Paused	Assert BUSY on all PPRODs?
Paused→Running	Remove BUSY from all PPRODs?
Running→Config	Assert BUSY on all PPRODs Log rates summary and other statistics for this run to database?
Config→Loaded	Stop rate monitoring program/thread
Loaded→Initial	Unlock crate/modules via Resource Mgr

Transition Actions: TTC

Transition	Actions
Initial→Loaded	Read database: – expected configuration of modules (TTCvi, BUSY, CORBO, etc?) – expected configuration of PPr and ROD crates – TTCvi settings Lock crate/modules via Resource Mgr?
Loaded→Config	Check expected modules are present Assert overall BUSY Load settings into TTCvi Send TTC broadcast to start/stop LVDS synchronisation? Configure PPr BUSY module to enable PPRODs in PPr crates Configure CP/JEP BUSY modules (if located in TTC crate) to enable CPRODs in ROD crates Configure system BUSY module to enable the other BUSY modules (if enabled in the configuration) Update module status in L1Calo IS server? Start crate monitoring
Config→Running	(Re)load settings into TTCvi? **Calibration/Test:** Send TTC broadcast to start synchronous playback Remove overall BUSY **Calibration/Test:** Enable local triggers
Running→Paused	**Calibration/Test:** Disable local triggers
Paused→Running	**Calibration/Test:** Enable local triggers
Running→Config	**Calibration/Test:** Disable local triggers Assert overall BUSY
Config→Loaded	Stop crate monitoring
Loaded→Initial	Unlock crate/modules via Resource Mgr