“Software(-ILD-SiD) Status”

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Topics

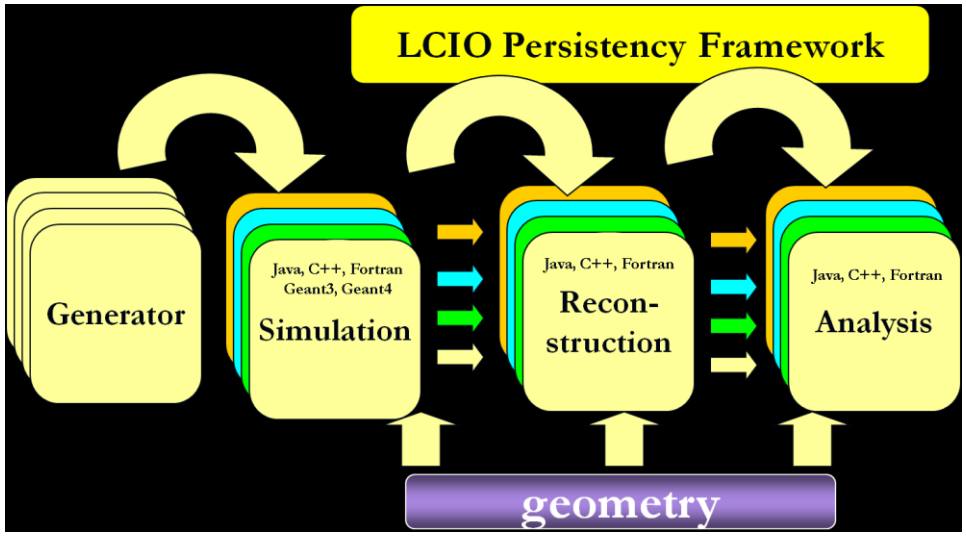
- Software Common Task Group
  - LCIO
    - Random Access Support
    - Towards LCIO v2
- SLAC “Scientific Computing Applications”
  - Support for
    - Wired
    - JAS/Plotter

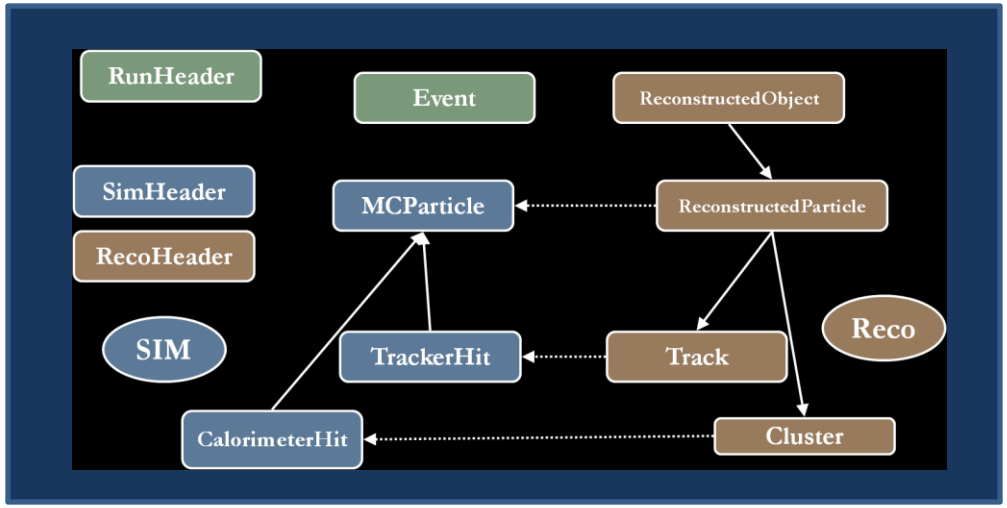
Software Common Task Group

- Coordinate tools and databases common to the detector concepts and code compatibility for simulation studies
  - Linear Collider IO (LCIO)
- Work with benchmark group to create common generator samples for LOI/DBD studies
- Current members:
  - Frank Gaede (DESY,ILD), Norman Graf (SLAC,SiD), Tony Johnson (SLAC,SiD), **Akiya Miyamoto** (KEK,ILD)

LCIO

- Used by ILD and SiD
- Supports C++, Java (and Fortran)
- Standardizes both
  - low-level (IO format)
  - high-level (reconstruction objects)
- Essential for sharing analysis components between experiments
  - PandoraPFA
  - LCFIVertexing



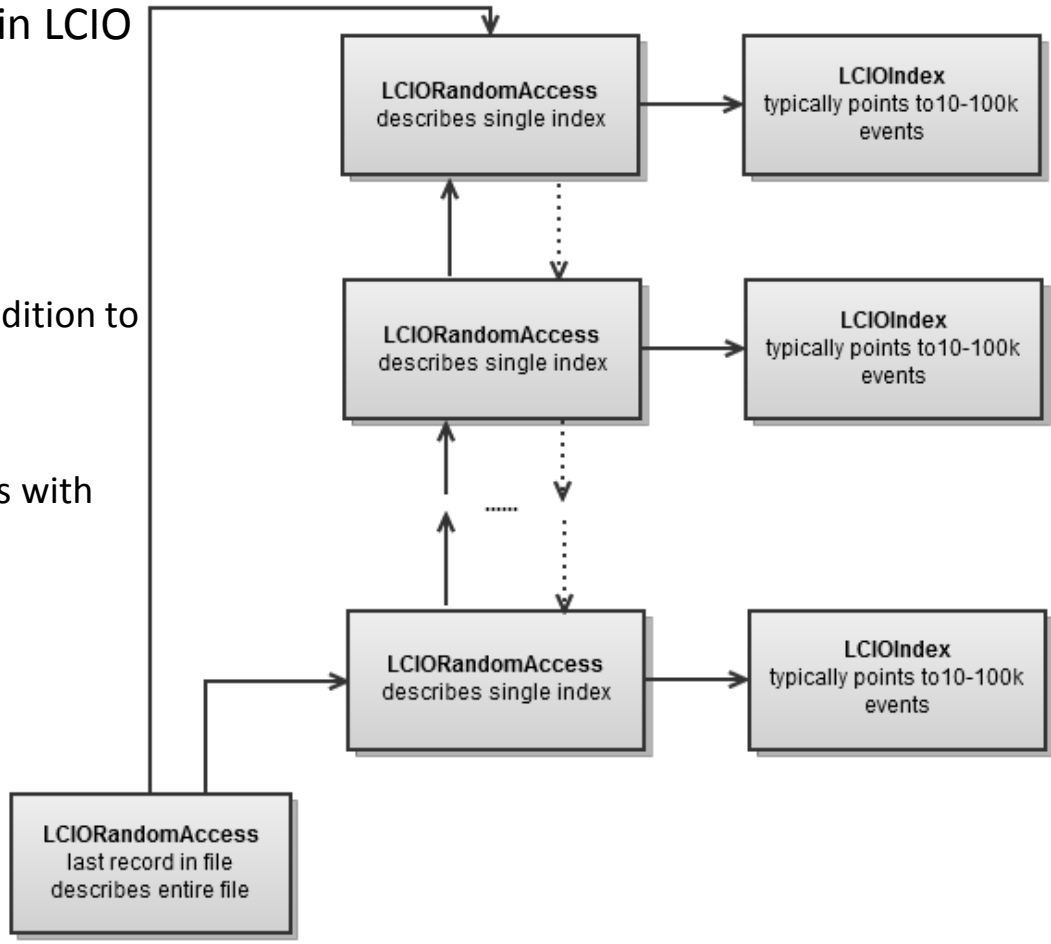


Towards LCIO v2

- When the LOI studies were completed in 2009, requests from users were collected, and an effort to upgrade LCIO from version 1.0 to 2.0 was launched
- Planned features
  1. Random access to event data
  2. Support of ROOT dictionary and IO
  3. Extension of track data model for 2D devices and improved treatment of kink and curl tracks
  4. Support for track parameters at multiple locations
  5. Keep additional generator information such as spin and color
  6. Partial reading of events, splitting of events over files
- LCIO 1.51 released including support for 1. and 2.
- LCIO v2 planning proceeding
  - Will be discussed immediately after ALCPG meeting
  - **Now would be an excellent time to provide input**

LCIO Random Access Support

- Allow efficient access to specific events in LCIO files. Events should be selectable by
  - Run
  - Run + Event
  - Index (i.e. 10000th event in file)
  - Tag (e.g. EMISS>200)
  - Access must work for "chains" of files in addition to individual files.
  - Must scale to support very large event sets
    - Complete index may not fit in memory
  - Must still be possible to read and write files with only sequential access
- Adds 2 new record types
  - Backwards compatible
    - Ignored by older implementations
    - Can easily be added to existing files
  - Forward pointers are optional
    - Files can be written sequentially
- Support added in Java and C++ implementations



Implementation Details

LCIORandomAccess.xml

```
<record name="LCIORandomAccess">
   There are two types of LCIORandomAccess records
     file record -- one per file, always first record on file
     index record -- one or more per file, points to associated LCIOIndex record
   <block name="LCIORandomAccess" major="1" minor="0">
       <data type="int" name="runMin"/>
       <data type="int" name="eventMin"/>
       <data type="int" name="runMax"/>
       <data type="int" name="eventMax"/>
       <data type="int" name="nRunHeaders"/>
       <data type="int" name="nEvents"/>
       <data type="int" name="recordsAreInOrder"/>
       <data type="long" name="indexLocation">
          Location in file of associated index. Always null for file record.
       </data>
       <data type="long" name="prevLocation">
          For file record location of first index record in file
          For index record location of previous index record (or null if first)
       </data>
       <data type="long" name="nextLocation">
          For file record location of last index record in file
          For index record location of next index record (or null if last)
       </data>
       <data type="long" name="firstRecordLocation">
           For index record location of the first record associated with this block
       </data>
   </block>
</record>
```

LCIORandomAccess

LCIOIndex

LCIOIndex.xml

```
<record name="LCIOIndex">
   <block name="LCIOIndex" major="1" minor="0">
       <data type="int" name="controlWord">
          Bit 0 = single Run
          Bit 1 = long offset required
       </data>
       <data type="int" name="runMin"/>
       <data type="long" name="baseOffset"/>
       <data type="int" name="size"/>
       <repeat count="size">
           <if condition="(controlWord&amp;amp;1)==0">
              <data type="int" name="runOffset">
                  Relative to runMin
              </data>
           </if>
           <data type="int" name="eventNumber">
              Event number, or -1 for run header records
           </data>
           <if condition="(controlWord&amp;amp;2)==1">
              <data type="long" name="locationOffset">
                  Relative to baseOffset
              </data>
           <else/>
              <data type="int" name="locationOffset">
                  Relative to baseOffset
              </data>
           </if>
       </repeat>
   </block>
</record>
```

Designed for future support of tagged events

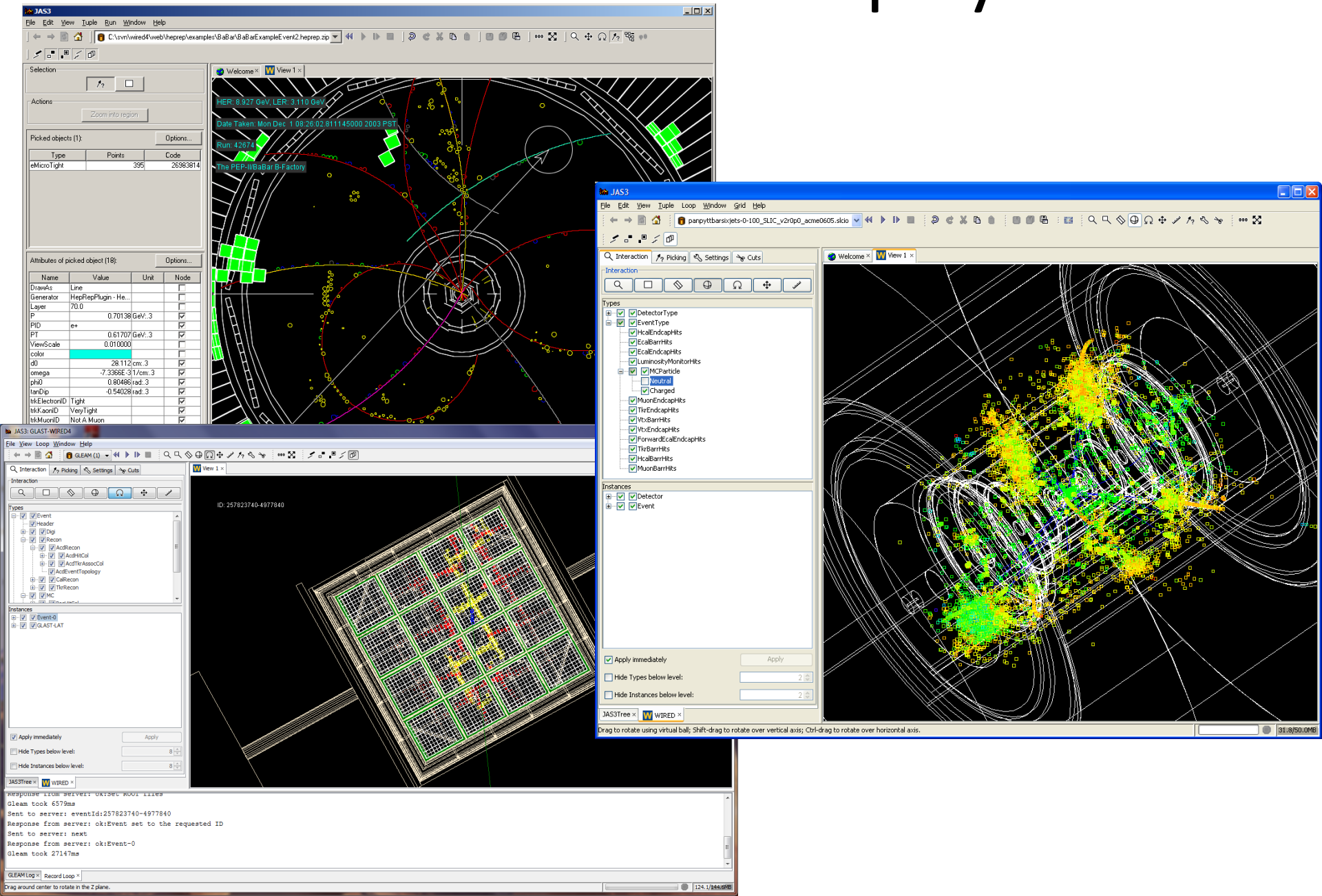
Efficient event selection based on tag

(e.g. EMISS>200)

SLAC Scientific Computing Applications

- New group formed at SLAC last year
  - Amalgamation of previous Babar, Fermi, Geant4, Computing Division groups
    - ~25 people providing software application support to experiments at SLAC
  - Currently no dedicated funding for ILC/SiD/lcsim
    - Proposal to support "Lepton Collider Detector Simulation Framework" being submitted to DOE
  - lcsim is getting some indirect support
    - WIRED
      - Support taken over by Dmitry Onoprienko
      - Effort funded by Fermi (a.k.a GLAST)
    - Reuse of Fermi pipeline/data catalog
    - JAS/Plotter
      - Support taken over by Brian Van Klaveren
      - Funded by Fermi, LSST
      - Work on new plotter ongoing

WIRED Event Display



WIRED Improvements

1. **Fix heprep object tree display/controls/synchronization.**
   - Multiple problems here. Customized SWING tree code is broken – no obvious way to fix. Numerous synchronization / event processing issues.
2. **Synchronize picking and instance tree view + related problems and requested enhancements.**
   - This requires significant changes to the way WIRED handles its components and communications between them.
   - Plan - write a single model class encapsulating WIRED view state; make all graphics panels, interaction handlers, control panels, etc. talk to it in a standardized way instead of talking to each other in proprietary ways. Make it possible to use arbitrary interaction handlers while viewing a particular control panel. Many functionality improvements can be made here – will need to figure out what is actually desired.
3. **Fix filtering pickable objects.**
   - At the moment, pickable types tree looses its state once the mouse moves away from it – not very useful.
4. **Actions: run through a pre-defined set of events and execute a set of commands (like saving a jpeg) for each event.**
   - Allow use of currently configured views.
5. **Show mouse coordinates when in a view where this makes sense.**
6. **Full screen mode.**
   - Make it possible to minimize each of the 3 parts of an MDI app ?
7. **Keyboard shortcuts.**
8. **Sharing settings between WIRED views. Initial settings for newly opened views.**
   - Should be easy once item 2 is done.
9. **Should be possible to override default color map.**
10. **Interactively reorder elements in instance, type trees** (alphabetical etc)
11. **Improvments to intercative cuts implementation**

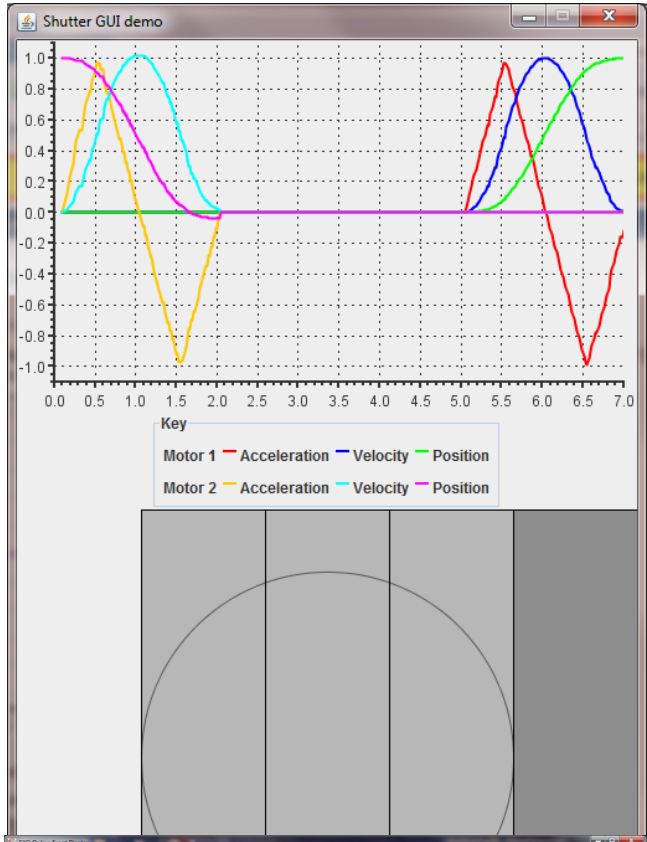
Wired Status

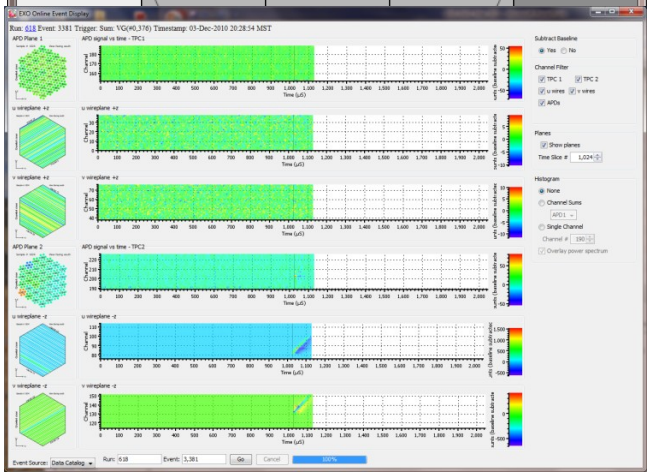
- Replacement for customized tree package - done.
- View model code - done.
- Finishing reorganization of WIRED components and communications code – this requires extensive amount of testing/debugging.
- Fixing newly found bugs along the way.
- Beta version of an updated WIRED plugin now in svn
  - Available for testing/feedback

- Now is a good time for bug fix / new feature requests
  – onoprien@slac.stanford.edu

JAS/Plotter

- New plotter under development
  - Already in use by EXO, LSST
  - JAS3 will be updated to include this plotter
- Many improvements over existing plotter
  - Cleaner design aids extensibility
    - More plot types
    - More control over plot style
      - “publication quality plots”
  - Cleaner separation of code separates graphics from code
    - Java 2D
    - pdf/svg/png etc
    - HTML5 canvas
    - opengl/webgl
- **New feature requests welcome**





Reuse of GLAST pipeline/data catalog

- "pipeline" + data catalog developed for GLAST
  - Allows automation/book-keeping/reprocessing for large number of batch jobs
  - Allows datasets to be easily found and accessed
- Can submit jobs to LSF, BQS, Condor
  - Being interfaced to Grid
- Already being used by EXO, SuperCDMS experiments
- Planning to use this for automation of future event sample generation

Task Filter: [ ] Regular Expression (?) Active in Last 30 days Latest Task Versions Filter Reset Defaults

Last Active	Task Name	Type										Total
2008-10-30 23:12	L1Proc	Data	0	0	5	78	1	0	0	0	0	84
2008-10-30 22:47	HalfPipe	Data	0	0	0	488	0	0	0	0	0	488
2008-10-30 22:39	nonEventReporting	Data	0	0	0	2207	14	0	0	0	0	2221
2008-10-30 22:13	GRB_blind_search	Data	0	0	0	1008	9	0	0	0	0	1017
2008-10-30 22:13	GRB_afterglow_launcher	Data	0	0	0	283	3034	0	0	0	0	3317
2008-10-30 22:12	GRB_refinement_launcher	Data	0	0	0	5596	1620	0	0	0	0	7216
2008-10-30 22:10	AspInsertIntervals	Data	0	0	0	1397	14	0	0	0	0	1411
2008-10-30 22:10	AspLauncher	Data	0	0	0	408	5	0	0	0	0	413
2008-10-30 21:31	DRP_monitoring	Data	0	0	0	211	7	0	0	0	0	218
2008-10-30 20:23	PGWave	Data	0	0	0	110	0	0	0	0	0	110
2008-10-30 19:47	allHEE200GeV-GR-v15r39p1	MC	0	0	0	29861	427	0	16	0	0	30304
2008-10-30 18:37	launchReport	Data	0	0	0	255	0	0	0	0	0	255
2008-10-30 16:28	Level0Xrootd	Data	0	0	0	38	0	0	0	0	0	38
2008-10-30 15:01	SkimmerTaskParallel	SKIM	0	0	0	80	8	0	0	0	0	88
2008-10-30 13:12	SkimmerTask	SKIM	0	0	0	33	10	0	0	0	0	43
2008-10-30 12:42	ReproTest8	Data	0	0	0	0	2	0	0	0	0	2
2008-10-30 10:40	AstroSkimmerTask	SKIM	0	0	0	262	81	0	0	0	0	343
2008-10-30 03:55	backgnd-GR-v15r40-Limbo2	MC	0	0	0	10	0	0	0	0	0	10
2008-10-29 12:31	setL1Status	Data	0	0	0	62	0	0	0	0	0	62
2008-10-29 12:16	aeffMonitorPulsar	Data	0	0	0	0	4	0	0	0	0	4
2008-10-29 08:12	GRB_afterglow	Data	0	0	0	137	3	0	0	0	0	140
2008-10-29 08:07	backgnd-GR-v15r40-Limbo	MC	0	0	0	3610	0	0	0	0	0	3610
2008-10-29 07:55	backgnd-GR-v15r39p1-FullDay	MC	0	0	0	70000	0	0	0	0	0	70000
2008-10-29 02:44											0	118