



GLAST Large Area Telescope:

Release System for GLAST Offline Software

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http://www-glast.slac.stanford.edu/software



Outline

- Introduction to GLAST and GLAST Offline Software
- Description of Offline Software Release Management System:
 - Nightly Build System
 - System Tests
- Summary



GLAST Mission

GLAST measures the direction, energy and arrival time of celestial gamma rays

-LAT measures gamma-rays in the energy range ~20 MeV - >300 GeV

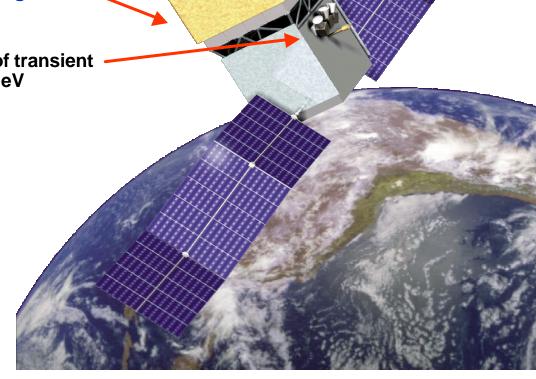
 There is no telescope now covering this range!!

- GBM provides correlative observations of transient events in the energy range ~20 keV – 20 MeV

Launch: September 2006 Florida Orbit: 550 km,

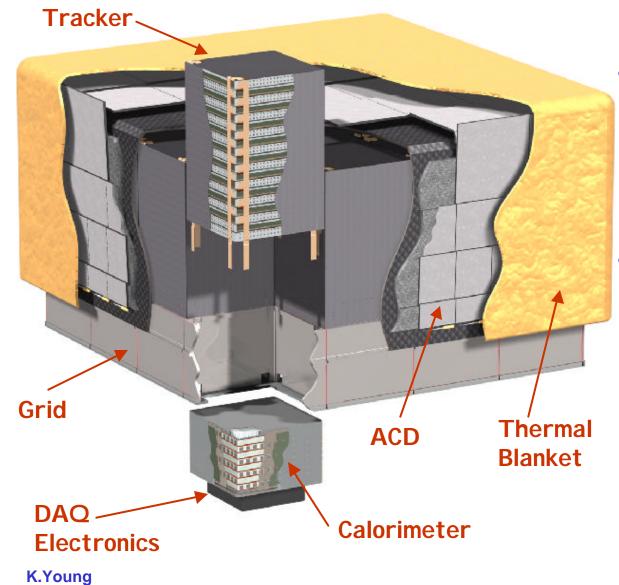
28.5° inclination

Lifetime: 5 years (minimum)





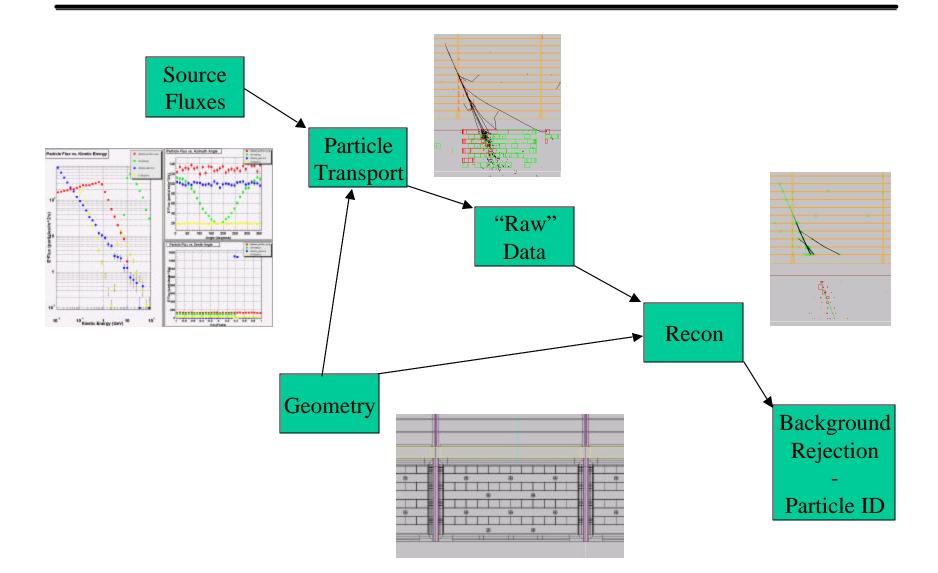
GLAST Instrument: Large Area Telescope (LAT)

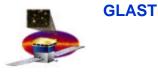


- Array of 16 identical "Tower" Modules, each with a tracker (Si strips) and a calorimeter (Csl with PIN diode readout) and DAQ module.
- Surrounded by finely segmented ACD (plastic scintillator with PMT readout).



GLAST Offline Software





GLAST Offline Software (continued)

Simulation software in C++; uses standard HEP software tools: CMT, Geant4, Gaudi, Root, CLHEP

Uses xml for representation of sources and geometry

Linux and Windows are supported operating systems



Motivation for Nightly Builds

Want to encourage developers to commit changes early and often while avoiding a train wreck at release time

Need to keep track of which versions of a large number of interdependent packages work (i.e. build and pass unit tests) and work together



Nightly Build Strategy

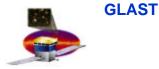
- Specify all packages associated with a software release via a "container" package – GlastRelease (cmt package with list of packages in the cmt requirements file) –
 - a tag of GlastRelease is a release
 - the HEAD of GlastRelease is a release in progress
 - LATEST (latest version of packages contained in GlastRelease) is a potential future release
- Require package maintainers to provide a unit test with their package (so far about 60 % compliance)
- Package maintainers specify which version of their package should be specified in current version of GlastRelease (not necessarily latest version of package)



Nightly Build Strategy (continued)

• Nightly build scripts try to build and run tests for:

- packages in current version of GlastRelease (if it has changed since previous night)
- HEAD, i.e. head version of GlastRelease (which contains tagged versions of contained packages)
- LATEST, i.e. the latest versions of all packages specified in GlastRelease (to try and anticipate looming build, run, and compatibility problems)
- Before a release is officially declared the system tests are run on the current version of GlastRelease, provided it successfully built and unit tests ran successfully, and the results of the system tests are evaluated.



Nightly Build Strategy (continued)

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Web page showing list of packages specified by GlastRelease, versions of those packages specified in the current version of GlastRelease, versions specified in the head of GlastRelease, and the latest tags for the packages in the cvs repository



Nightly Build Strategy (continued)

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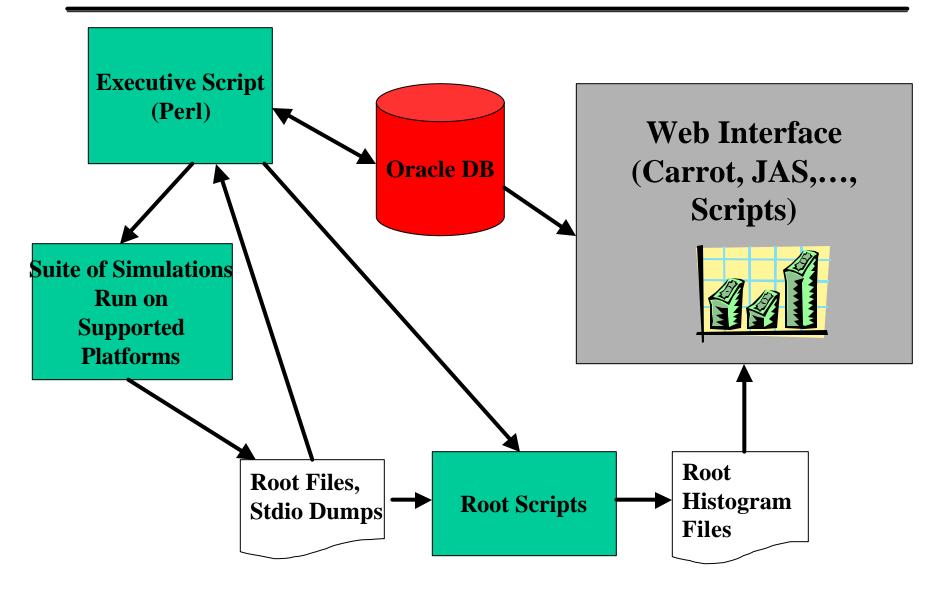
Web page showing status of builds and tests for different versions of GlastRelease as well as status for builds of the head of GlastRelease, and the "latest" build (builds and tests using latest versions of packages specified in GlastRelease) K.Young



- Provide end to end test of system under different conditions (after verifying that the last nightly build was successful)
- Track performance of offline software, release by release, via a broad range of diagnostics
- Allow for use of diagnostics, via comparison to a standard set of diagnostic results, to determine when GlastRelease is actually ready for release



Architecture of System Tests



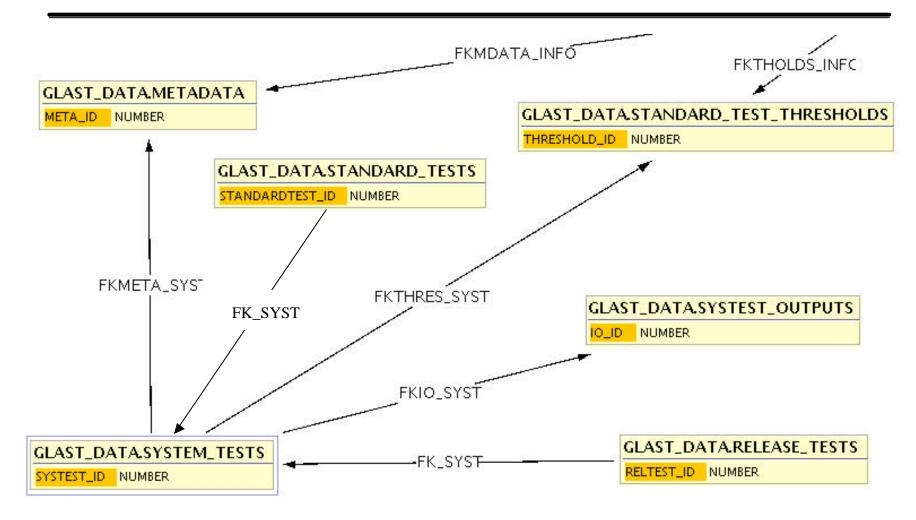


System test relational tables (as a part of larger data tracking and release system database) designed to maximize flexibility and extensibility – allows for tracking, across software releases, of both:

- instrumental quantities (track multiplicity, energy deposited in subsystems,...)
- operational quantities (cpu and memory usage,...)



System Test Database (continued)



Entity diagram for system test tables in DB



- Intended to provide easy access to and analysis of system test results
- Based on scripts (currently experimenting with both Carrot and JAS) that display histograms and metadata form system test database
- Prior to programs like Carrot and JAS, displaying such extensive information via the web was difficult
- Histogram display allows for overlaying of test and standard histograms for quick visual impression (scripts also calculate the Kolmogorov-Smirnov statistic as a diagnostic measure of the difference between test and standard histograms)



Comparison of Carrot and JAS

- Carrot
 - Web development reasonably easy modulo subtleties re. Carrot "write" statements
 - Carrot threads are fragile require bullet proof scripts
 - Oracle connections require initial Root configuration setup
 - Root functionality native
 - Plotting faster than JAS (but on faster dedicated machine and with no optimization of JAS)
 - Last release winter '02
 - Broke with Root 3.04.02
 - Remote support
 - Possible security problems

- JAS
 - Web development easy via, e.g. FrontPage
 - Oracle connections, i.e. ODBC connections via IIS, straightforward
 - Fetching DB results with vbscript straightforward
 - Lacks some of Root's functionality
 - Possibility of using netbeans (gui tool) for building Root access pages
 - Local support available



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Web portal (JAS) to system test information



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Web page containing diagnostic info. and access to histograms for specific system tests



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Web page containing metadata for specific system tests



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Web page containing overlaid Root histograms from system tests and standard



Summary

- A reasonably robust Release Management System for GLAST Offline Software has been designed and mostly implemented
- Nightly build system allows for rapid development and continuous testing of complex, multi developer, multi institution software, and thus greatly reduces problems encountered at release time
- System tests allow for easy viewing and analysis of extensive diagnostic information prior to release
- Focus now shifting to content of system tests rather than infrastructure design