GLAST Large Area Telescope

Monthly Mission Review

LAT Flight Software Status

June 6, 2007

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Stanford Linear Accelerator Center

FSW - Overall Status

- **B0-10-1 available for upload to LAT**

- **B1-0-0 on schedule for 6/26/07 delivery to LAT**
  - **Target build date: 6/8/07**
  - **Upload to LAT: week of 6/26/07 (or when schedule allows)**

B1-0-0 Status

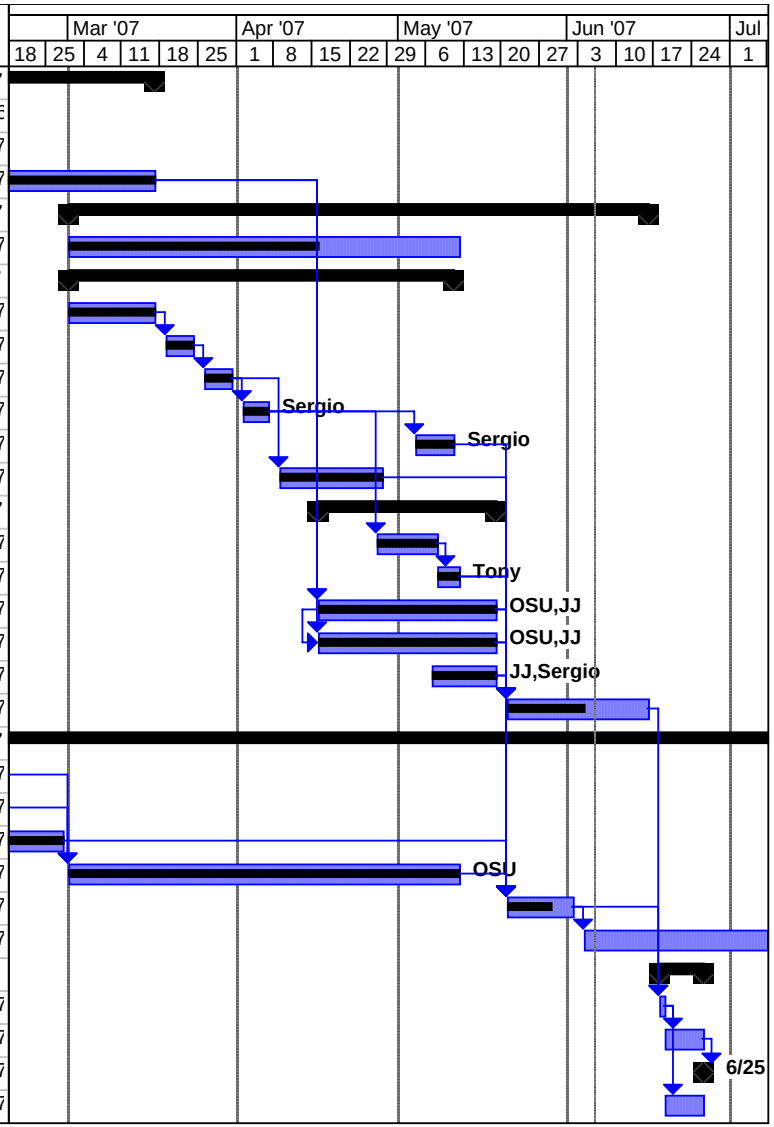
- Testing of GRB algorithm and GRB infrastructure against Testbed continues out of SLAC development area prior to formal build release
- Released:
  - GRB, GRB_DB (code to support SIU/EPU GRB messaging protocol)
  - GRBP, GRBP_DB
  - GRBS, GRBS_DB (LAT-detected GRB simulation code)
  - GRBU (code to time-sort/merge events arriving at SIU from EPUs)
  - LPA, LPA_DB (physics acquisition code that supports new GRB code)
- Anticipated by the end of this week:
  - GRB clustering and localization algorithm
  - EPU-side code: tracking and data structure
- Build contents:
  - LCI bug correction
  - Updates to LIM, LATC, event filter, compression, LAT-GBM interface
  - FSW-292: GRB detection algorithm
    - 5.3.10.2.1 GRB Location Accuracy
    - 5.3.10.2.2 Modification of GRB criteria
    - 5.3.11.3.3 Process Attitude Data
    - 5.3.11.6 GRB Alert Message Latency
    - 5.3.11.7 LAT GRB Repoint Request Message to SC
    - 5.4.1 System of Units (metric system)
    - 5.4.2.x Coordinate Systems (3 requirements)
    - 5.4.3 Resource Margin

Progress on GRB algorithm

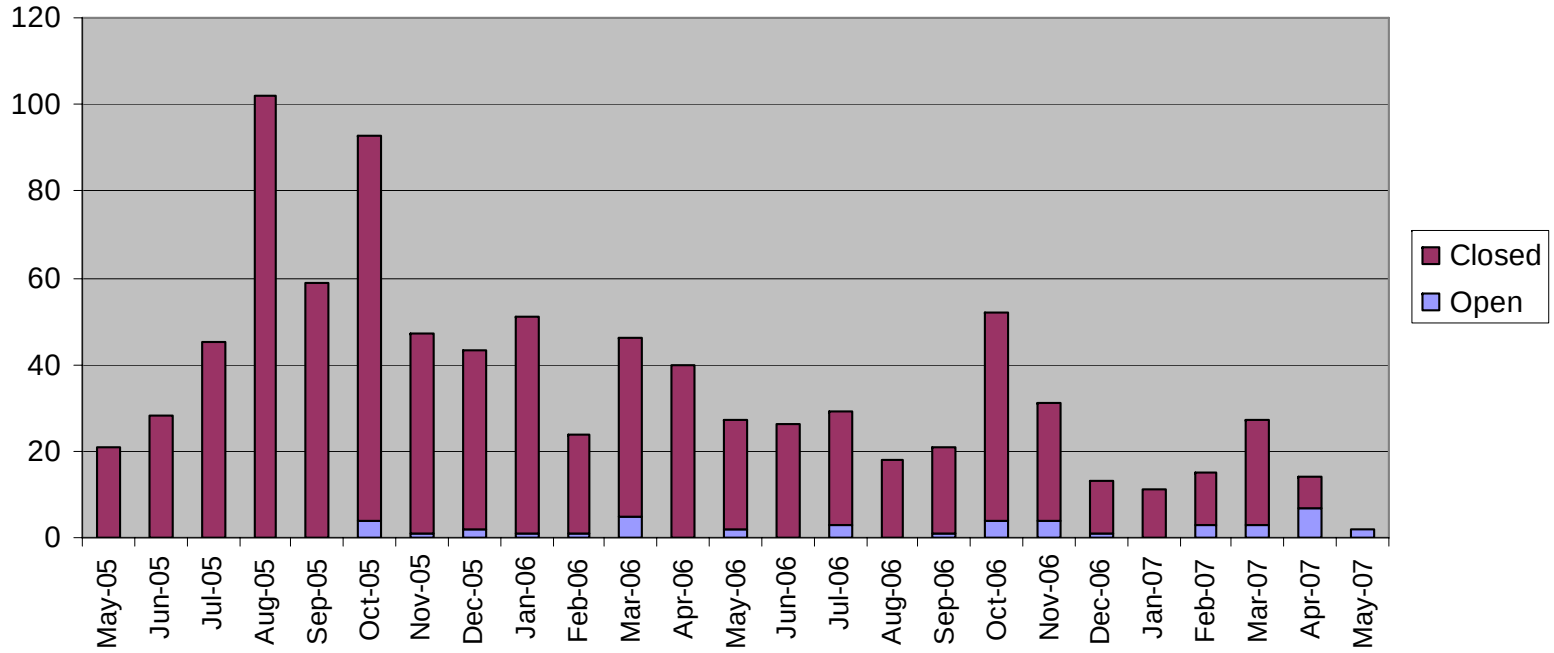
- **Progress on GRB algorithm:**
  - GRB framework has been successfully used to deliver series of GRB messages (GRB suspected, update, confirmed, closeout)
  - Integration of algorithm into the GRB framework has been accomplished
  - Ongoing improvements
    - Investigating refinement of on-board localization calculation
    - Improve tracking for GRB identification, reduce input rate to the algorithm
- **Progress on testing of GRB algorithm:**
  - Necessary MC has been obtained
  - Needed Testbed infrastructure is in place
  - Completed first test pushing data from the FES to the SIU
    - verified data integrity and coordinate conversion
    - proved that we can synch attitude information delivered by the VSC over 1553 with the FES data
  - Future tests:
    - Data delivery through full GRB chain (including missing pieces)
    - Timing of delivery of alert messages
    - CPU performance of algorithm (not a neat, clean number to obtain)
      - varies with input rate to algorithm, depth of GRB photon list, etc.
    - Science performance of algorithm

GRB Deployment

ID	Task Name	Duration	Start	Finish
1	**GRB Algorithm (physics) Development**	**69 days**	**Mon 12/11/06**	**Fri 3/16/07**
2	First Delivery (OSU)	0 days	Mon 12/11/06	Mon 12/11/06
3	FSW Review	44 days	Tue 12/12/06	Fri 2/9/07
4	2nd Delivery (OSU)	25 days	Mon 2/12/07	Fri 3/16/07
5	**FSW GRB Algorithm Coding**	**77 days**	**Thu 3/1/07**	**Fri 6/15/07**
6	GRB Additional Filtering (OSU)	52 days	Thu 3/1/07	Fri 5/11/07
7	**Track Selection and Direction Extraction**	**51 days**	**Thu 3/1/07**	**Thu 5/10/07**
8	Track Finding	12 days	Thu 3/1/07	Fri 3/16/07
9	Multi tower track projection	5 days	Mon 3/19/07	Fri 3/23/07
10	Select best track(s)	5 days	Mon 3/26/07	Fri 3/30/07
11	Format Data structure	5 days	Mon 4/2/07	Fri 4/6/07
12	Transport data to SIU	5 days	Fri 5/4/07	Thu 5/10/07
13	Direction Extraction	15 days	Mon 4/9/07	Fri 4/27/07
14	**GRB algorithm**	**25 days**	**Mon 4/16/07**	**Fri 5/18/07**
15	Merge data streams from 2 EPU	7 days	Fri 4/27/07	Mon 5/7/07
16	Timeorder events and feed to GRB Algorithm	4 days	Tue 5/8/07	Fri 5/11/07
17	Selection / clustering in direction & time	25 days	Mon 4/16/07	Fri 5/18/07
18	Localization of clusters	25 days	Mon 4/16/07	Fri 5/18/07
19	GRB triggering & comm protocols	10 days	Mon 5/7/07	Fri 5/18/07
20	Code Iteration & Contingency	20 days	Mon 5/21/07	Fri 6/15/07
21	**Test**	**130 days**	**Mon 1/15/07**	**Fri 7/13/07**
22	GRB Monte Carlo - FES input format	22 days	Mon 1/15/07	Tue 2/13/07
23	GRB Monte Carlo - VSC Attitude input	22 days	Mon 1/15/07	Tue 2/13/07
24	Synchronize FES and VSC Attitude streams	10 days	Wed 2/14/07	Tue 2/27/07
25	Generate sim GRB with Attitude Info (OSU)	52 days	Thu 3/1/07	Fri 5/11/07
26	1st FSW GRB functional test	10 days	Mon 5/21/07	Fri 6/1/07
27	Science Performance Studies	30 days	Mon 6/4/07	Fri 7/13/07
28	**FSW B1-0-0**	**6 days**	**Mon 6/18/07**	**Mon 6/25/07**
29	Build & Testbed Verifcation	1 day	Mon 6/18/07	Mon 6/18/07
30	Delta FQT-B (Requirements sell off)	5 days	Tue 6/19/07	Mon 6/25/07
31	FSW Requirements Complete	0 days	Mon 6/25/07	Mon 6/25/07
32	Upload to LAT	5 days	Tue 6/19/07	Mon 6/25/07



JIRA Metrics as of 4 June 2007



- **Open issues are divided as follows**
  - **14 planned for B1-0-0**
  - **16 planned for B2-0-0 (post L+60)**
  - **13 deferred indefinitely**
  - **1 being assessed by FSW team**
- **A record-shattering (in a good way) 2 new issues for the entire month of May**

FSW-934

- Description
  - Add telemetry to report on LAT state/configuration
    - Memory scrub information
      - Remove existing diagnostic messages that report scrub info every 3 minutes
      - Replace diagnostic message with telemetry: timestamp of latest scrub completion, period of scrub
    - Instrument power state/configuration
      - PDU/GASU power, GBM prim/red, PPS prim/red/internal, LPA mode
    - Files currently in use by FSW
      - LTC config, LHK schedule + limits, LATC config + ignore, LCI schedule, LPA_DB id
    - GEM statistics
      - Modify existing mnemonics to handle rollover of counters
    - Time Hack Services (THS) information
      - One bit to indicate whether time tone is being simulated
      - One bit to indicate whether time hack is being simulated
    - GRB response
      - LAT response to a GRB enabled/disabled?
- Packages affected: LHK (LTC, LCM, LCI, LATC, LPA, THS)
- Consequence of exclusion
  - Unable to track/monitor LAT state without full command history
  - Unable to verify the correct execution of a telecommand
- Benefits of inclusion
  - Visibility in operations
- Target build: B1-0-0

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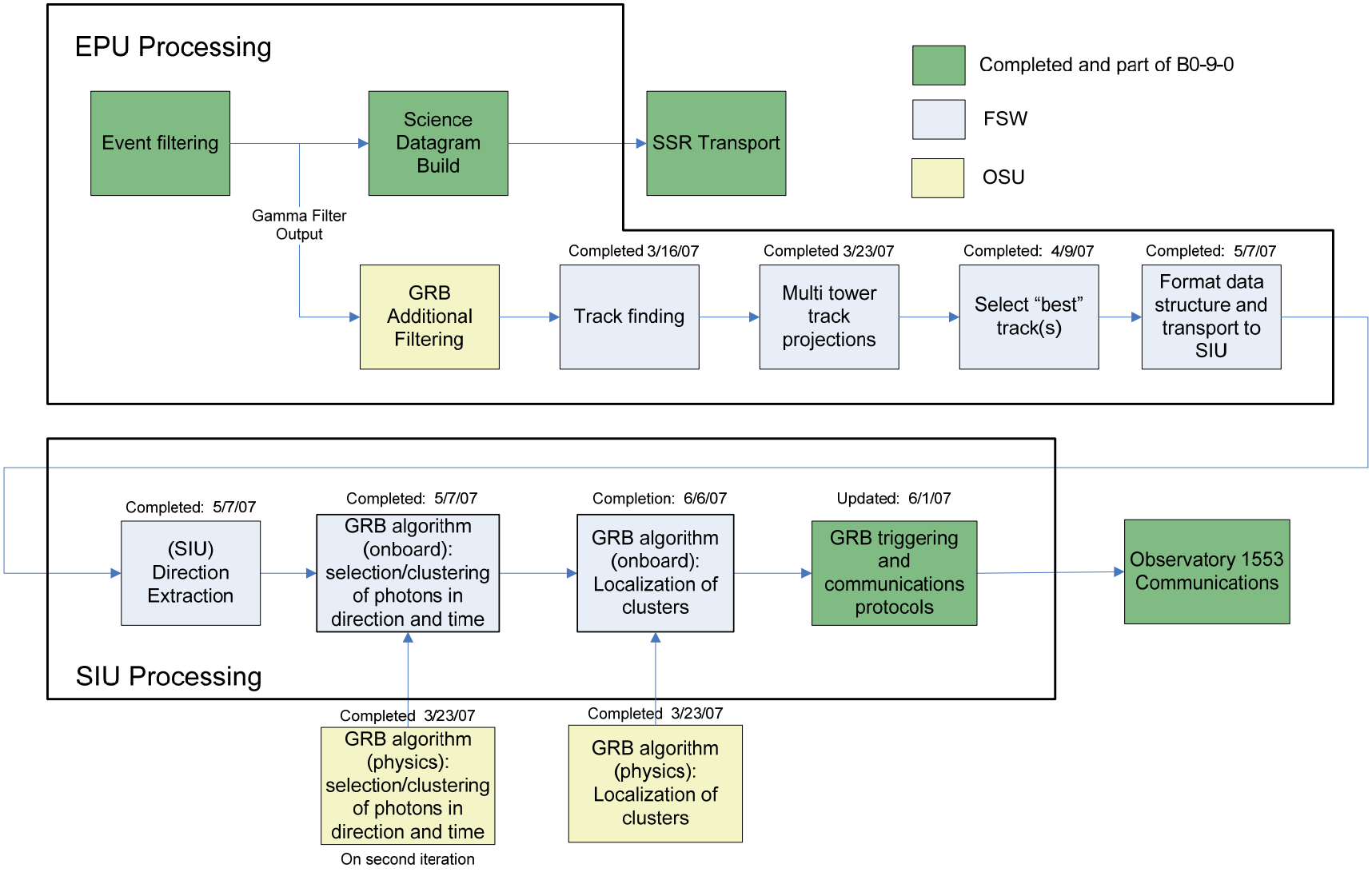
Backup

Stanford Linear Accelerator Center

GRB Processing and Detection Dataflow



Testing GRB detection algorithm

- **Diagram below shows dataflow and highlights the missing pieces of infrastructure**
  - **Diagram does *not* show testing of LAT-GBM interface which has already been done during FQT-A**
  - **Test scripts are being written by FSW to**
    - **analyze science data to evaluate performance of GRB detection algorithm**
    - **analyze telemetry to obtain CPU utilization (needed to satisfy resource margin requirements)**