GLAST Large Area Telescope

Monthly Mission Review

LAT Flight Software Status

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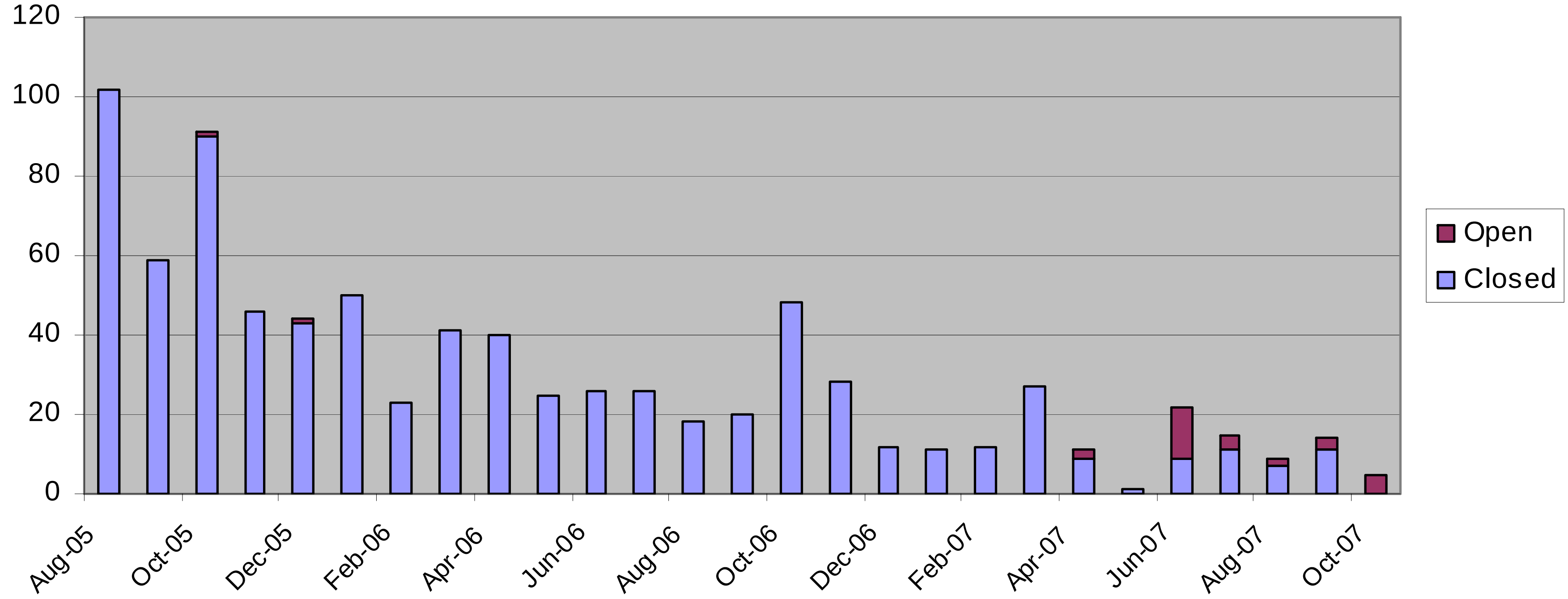
FSW Status

- B1-0-2 progress
  - Remaining effort:
    - Testing of additional housekeeping information
    - Testing of filter statistics for non-gamma filters
    - Miscellaneous IVV4 fixes (new)
    - LIM/GRBP bug fixes (new)
    - Addition of stall after GARC LAM (new)
  - Roll build on 10/12
  - Two weeks of testing (see next slide for details)
  - Ready for upload, 10/26
- B1-0-2 does not contain any large perturbations. Targeted changes included in this build only affect a few packages:
  - Low rate science counters can be routed to SDI
  - Filter statistics added to science stream to monitor performance of onboard event filter
  - Bug fixes to GRB algorithm
  - Tweaks to PIG/LIM to adjust delays and fix bugs
  - Report HSK information on LAT power and LAT physics acquisition

B1-0-2 regression testing (10/12 - 10/26)

- Run FSW unit tests on all FSW packages that have been changed, (LHK, GRBP, etc.), prior to release of code
  - Where changes to code were made, do side-by-side comparison of code performance before and after to verify that output or performance is identical (except where bug fixes change performance)
- Run FQT regression test suite against final build on testbed (3 days)
  - Testing includes all packages, even those that haven't changed
  - Verifies that all of FSW requirements are met
  - Compare results of B1-0-1 testing to B1-0-2
- Run selected portions of CPT using LICOS on testbed (5 days)
  - Verifies that LICOS Scripts have kept pace with FSW additions/changes
  - Reassurance that there will be no surprises during testing on the LAT
- Use PROCs to perform LEO power up sequence and exercise nominal data taking on testbed (1 day)
  - Verifies that PROC performance unaffected
  - NOTE: Inspection of B1-0-2 changes to dbx shows that PROCs should work identically in B1-0-1 and B1-0-2
- Upload to LAT and run selected portions of CPT in config 1 (~4 hours)
- If anything slips through this testing, it will be caught by the subsequent LAT CPT

JIRA Metrics as of 4 October 2007



- Open issues are divided as follows
  - 29 items planned for B1-0-2 (13 individually tracked housekeeping additions)
  - 1 item planned for B1-0-3
  - 1 awaiting FSW CCB adjudication

- Note: does not include candidate post-launch items (i.e., “Deferred”, “B2-0-0”)

Solaris 9 → Solaris 10 transition

- SCCS upgraded the public Solaris servers from solaris 9 (w/ gcc-3.2.3) to solaris 10 (w/ gcc-3.4.3)
  - As a result, numerous warnings affecting about a dozen packages are produced during FSW builds on the Sun where the majority of software unit testing is done.
  - Compilation warnings derive from compilation on Sun, do not affect flight binaries
    - Although the gcc compiler has changed, the cross compiler that actually produces the flight code has not. Consequently, the move to gcc-3.4.3 alone has no direct effect on flyable code.
  - These warnings can be eliminated by rephrasing the affected code.
  - These changes are purely syntactical in nature and have no effect on the coding logic.
- Consequence of ignoring such warnings
  - Warnings and errors during compilation are indications of potential bugs or problems.
  - Releasing a FSW build with warnings during compilation is a violation of the rules in the flight software management document
  - If the warnings are not eliminated, the noise generated by a build will make it significantly more difficult to identify substantive issues
  - New compiler releases may improve optimization of code

Proposed solution for B1-0-2+

- Complete B1-0-2 without making solaris-inspired changes
- Test against testbed, upload to LAT, regression test on LAT as planned
- Make controlled changes to each of the affected packages, as necessary
  - Changes made by experienced programmers, familiar with the code
  - Developers will assess each potential change intelligently and decide how to address the warning
- Perform unit tests on affected packages
- Release changes as B1-0-3
  - Regression test on testbed (FQT, CPT, PROC validation)
  - Compare performance to B1-0-2
  - If performance is identical, make B1-0-3 available for upload
    - Either find the time to upload B1-0-3 to the LAT
    - Wait until the next requested bug fix forces a build (B1-0-4) or B2-0-0 (post-launch) and incorporate/upload the changes as part of that build

Validating code produced with gcc 3.4.3

- How do we get assurance that code is functionally identical to previous version? What could go wrong?
  - Introduce a syntactical error or typo
    - Most likely caught by compiler, warning becomes an error
  - Change functionality/logic of code
    - Error caught by FSW unit tests (target to test changed code)
    - Second line of defense: FQT and/or LICOS CPT
    - Finally, PROCs can be re-validated against new build on testbed, to reassure ourselves that build behavior has not changed
- Gain additional reassurance with extended runs on testbed
  - Stress test software by running extended nominal data-taking run
  - Vary data size and event filter configuration
  - Monitor filter performance, CPU load, memory usage, and other parameters to ensure nominal performance

Future transitions

- Cross-compiler that produces flight code is frozen
- ISOC owns 4 Suns (that came with solaris 10) for maintenance and compilation of FSW builds
  - Currently, these machines are maintained by SCCS
  - Patches installed when available
  - FSW/ISOC can work with SCCS on timing of updates
- Avoid being “surprised” by future transitions:
  - Strengthen relationship with SCCS
  - New versions of solaris are released approximately every 2 - 3 years
  - Decide on case-by-case basis whether to change code
- Would such a change trigger the upload of a new FSW build in the future?
  - No, this would not be the driver for a new build
  - However, any approved changes would be incorporated into the next FSW build, triggered by a bug fix or improvement

Implications

- Implication of not moving code forward with OS upgrades
  - Live with warnings
    - Forces FSW to sift through a lot of noise to find real problems
    - Ignore increasingly more sophisticated compiler warnings resulting in un-optimized code
  - If we choose to change the code to eliminate the warnings, as appropriate, we need to ---
    - Unit test the modified code
    - Regression test build on testbed, as usual
    - Upload at next reasonable opportunity
- FSW will not attempt to carry a code branch
  - A code branch defeats all of the tools we have developed to manage code versions
  - No resources to do this bookkeeping
  - Risk uploading the wrong code modules or releasing incompatible versions of packages