

D0 Trigger Database Taskforce Requirements for Trigger Database

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Preamble

There are two main motivations for the next phase of evolution of the trigger database (TDB): First, to implement features required for the Version 15 trigger list for the IIb upgrade, and second to if possible modify the implementation to cut development time so that other desirable but not absolutely necessary features can be added with a reasonable effort. Among these are a number of features long planned but never implemented, and general improvements to the user interface. This document describes the user-visible features, and indicates relevant time scales and priorities. For some features, the final requirements must be determined iteratively: further refinement of the specifications will go hand in hand with determining likely implementation costs, and may result in de-scoping of the feature or staged implementation. A proposal for implementation is in preparation.

To carry out these goals may require other work not specified here, and not directly visible to users which either improve the stability, performance, documentation, or maintainability of the database; these items are discussed briefly in an Appendix. These are not explicit user requirements, though new functionality may require work of this sort to achieve reasonable interactive responsiveness.

In this document, the term Trigger Database is interpreted broadly to include the database itself, operational support from the computing division (entry of non-routine items, advice to users, etc.), and the key interfaces between the database and users: reporting, entry, and xml generation for online or simulation purposes, or more generally, everything upstream of COOR and COORSIM. Users include both triggermeisters, the task force members when carrying out operational support of the trigger database, and physics end users. The database serves as the mechanism for building trigger lists online into downloadable xml files, and also as the archive recording what actually ran online. The archiving function imposes certain requirements for backwards compatibility and version control.

Many of the requirements items still need more detailed specifications before actual implementation work can begin. D0 and CD will work closely on refining specifications for these items.

Items removed from the list of requests since May 2005 are listed in the Appendix.

Prioritization

Each item below is classified in several dimensions:

Time Scales

The time scale of implementation may directly affect the usefulness of the feature.

- Now or Never - a specific time window beyond which the utility of the feature is unclear
- V14 - useful for current Version 14 trigger list or development of V15 list.

- V15 - required by end February 2006 for the first Run IIb trigger list, Version 15. This time scale represents the beginning of the shutdown, assuming that new capabilities will need to be exercised during installation and commissioning.
- V15+ - still useful, but not absolutely required on V15 time scale, even though items would help construction of V15 trigger list; still useful in further evolution

Priorities

- Required - essential
- Highly Desirable
- Desirable – implemented if time permits

Difficulty

This classification is mostly driven by the degree of structural change in database

- Straightforward - no structural changes to TDB; changes to xmlgen only, or entry of new items into database
- Moderate - addition of new attributes (“columns”) to existing tables; the difficulty of this will depend on technology choices. Currently, even adding columns is a considerable effort; if it were chosen to replace the database server (a very considerable effort), future modifications such as adding columns might be made substantially easier.
- Difficult - will require structural (“schema”) changes to database, or substantial new code. In this document, schema changes mean new tables, or new relationships between tables. Such changes will always be more difficult than adding columns, though both might be easier with different technology choices.

Requirements

Present Functionality Completion

C1) Trigger Transformation Tool

(Required, V15, Difficult, needs more detailed specifications)

Rippling upward changes in L3 trigger but without changing shape of trigger tree [the current release continues preparation work]. “Trigger transformation by neoterms and L1/L2/L3 scripts possible. Needs extension to L2 and L3 tools.” [1.15] (*i.e. see reference [1], page 15*)

Involves searching for groups of triggers containing named object/version at various levels, and then modifying/replacing these selected elements: I created a new version of L2 term, change it in every script then change the script in every trigger. See also [1] for some of the components needed; many performance issues in the entry interface (via DB server) may also need to be dealt with; these issues will probably only get worse as more and longer trigger lists are entered.

C2) Improve error detection and/or correction

(Desirable, needs detailed specifications or should be moved under operations/maintenance)

C2a) *Arnold to provide a "top 5 issues" list in this area for evaluation; might include: better flagging of errors or prevention of xml or download with flagged errors? [1], tdb_terms, p 7; Performance problems with Entry modules need continued work (see [1] p 9 et seq.). See also [1.12] p 12 for trigdb_neoterms error message problems. [1.7] error report when term missing parameters in tdb_terms; [1.4, 1.17] system constraint enforcement examples; Arnold to provide further specs.*

C2b) Making error messages more “obvious”; perhaps flagging changes in resource-level files such as number of parameters; perhaps preventing final xml generation with unresolved errors? Needs better specification. Not run IIb-specific.

C3) User interface improvements

C3a) (Desirable, not Run2b-critical, need concrete specifications) Add descriptive columns to specific trigger conditions: ownership (group name), purpose (analysis, luminosity, monitoring...), {L1, L2, L3 rates at target luminosity (predicted and measured)}; perhaps type: (lepton, jet, etc). [for estimate, not much info needed]

C3b) (V15, Desirable, need concrete specifications, moderate difficulty) Be able to search and to sort these on these and other columns. Groupings like this are essential to understanding views of the trigger list. Prescales are grouped by L1 bits, as just one example. If we go to bandwidth quotas, need to group by other classifications, say by type and/or by group name. Ideally as straightforward as Excel. See also names of groups of triggers below? *Specs to be provided by Terry Toole and Arnold.*

New trigger functionality**N1) L2 Splitting, oring**

N1a) (Required, V15, Difficulty: oring-difficult, splitting-straightforward)

Support BOTH L2 splitting and L2 Oring within a single trigger list, selected L3 bit by L3 bit. Minimum requirement is sufficient support to use more trigger bits at L2 than at L1. *Marco will provide target xml to specify the functionality.*

N1b) (Highly Desirable, V15, Moderate to Difficult)

Splitting/Oring carries with it the implicit requirement for a user interface appropriate to support entry and maintenance of more complex trigger lists needed for Run IIb. As an example, this may entail handling of groups of related terms as a block. *The detailed specification would depend on the implementation of N1a).*

N2) Support of RunIIb tag for new triggerlist terms

(Required, Run2B-critical, V15, moderate)

The only know issue for entry of IIb hardware support.

N3) Support nolum

(Now or never, not IIB-related, Desirable, Straightforward)

Support for better physics use of exposure groups. See [5] (a better implementation than in [1.19] ?)

N4) Parameters for L2 preprocessors

(Desirable, Moderate/Difficult, V15+).

Currently, these are hard-coded in xmlgen, though they should be derived from the database. This is acceptable currently because this class of parameters has been static for some time. They will start changing again during commissioning of the Run IIB L2Cal preprocessor, requiring hand record-keeping as they evolve. The current xml generated for L2 cfg files (for coor/DB) is located in /online/data/coor/resources/ and parameters for L2 are mostly in l2resources.xml, l2tools.xml and l2pps.xml; see [1.16] for elements of the design, some of which has already been implemented; *EG to provide status*.

N5) Better support for trigsim users

This requirement is somewhat different than the others, which center on the trigger database as used for operation of the experiment itself, rather than its simulation as used in analysis (and design of trigger lists). The original choice of using a DB server was intended to support trigsim users even at remote sites. Now entry access to the TDB is mostly restricted to triggermeisters because of the high training requirements needed to work on the “live” online database without causing problems. The implementation issues may be quite different from those with the other requirements, and it is not entirely obvious this requirement can be met within the context of the existing trigger database. Brainstorming and research is necessary before a concrete implementation can be proposed.

N5a) (Highly Desirable, V15+, Difficult or worse)

Trigsim users should be able to create, modify, or use existing trigger lists or subsets of lists, and generate xml capable of driving the trigger simulation, without interfering with online operations. They should have access to present and past trigger lists, and those currently under development. Currently the only available functionality is to generate xml from existing trigger lists, or undergo training near the level required of triggermeisters.

N5b) (Desirable, V15+, Moderate/Difficult)

Generate Trigger Rate Tool input file for subsets of trigger lists. *Specs needed from Miroslav or Reinhard*.

References

- [1] EG_TDB_Plan.pdf http://d0db-dev.fnal.gov:8514/atrig/TDB_Plan.html Existing project plan for some items.
- [2] EG_TDB_Plan_Part_2.pdf (email to Amber, July 13, 2005)
- [3] EG scripts http://www-d0.fnal.gov/d0dist/dist/packages/trigdb_database/devel/fixes/
- [4] EG_Nov14.pdf (EG emails to Igor et. al.)
- [5] Nolum.pdf (Michael Begel email to Nikos)

Appendices

1. Items removed from the Requirements since the May 2005 review:

N6) Correlation of software/firmware version numbers and trigger list releases. Allows better online checking of downloads. Dropped because of implementation effort required outside of trigger database for Level 12 [1.20], and by Level 3 as not critical to current scheme of download checking; L3 software releases are synchronized with trigger list changes. Natural also to track L1 firmware versions [1.21] but in practice they change seldom during taking of “real” data, and are really used to mark data taking epochs (which do not get generated by reading databases). Changes in L1 firmware are also marked by trigger list version changes.

Streaming [1.21]; some version implemented now, different from earlier proposals

Engaged device lists [1.16]; possibly part of an earlier implementation proposal for N3?

L1 pseudoterms: TDB never supported original L1 hardware/firmware [1.20]; most capabilities exist in new Run IIb trigger hardware and will be supported in V15

sDAQ support [1.21] not clear there was ever a specific request

2. Internal support Requirements (item C4 in previous versions of the list)

Maintenance, operations support, performance improvement, support for DB modifications currently done "by hand", either in SQL or modification of xml. *Elizabeth to provide a "top 5 issues" list for evaluation. Eventual prioritization by Igor in consultation with D0.*

Examples:

Notes for various by-hand procedures in [3];

Change element descriptions (History column) for L1_par.Par_desc: [4] says it's in [1] but I couldn't find it.

Cleanup, stabilization and automation of status handling [1.13, 19, 22 (several)];

Separation of xmlgen and other interfaces from TDB server CVS package [1.22]

Develop better release procedures for TDB

Marshalling problems; test links for entry interface? [2.3]

Cleanup of report interface [1.14]

Report interface performance: materialized views? [1.17]

Entry interface performance [1.18]

Db server deficiencies: *specs needed from EG?*

xmlgen other issues: referred to but not explained by EG; *specs needed from EG*

Moving off SAM machine (EG argues SAM should move instead) [1.18]