

Introduction to the Calibration Database

Outline of the Design

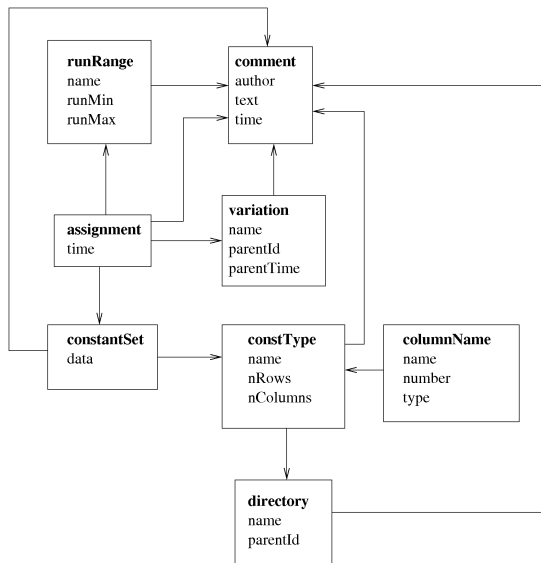
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Table Definitions

- Database tables express objects and relations among components in the problem space being addressed
- Developing, applying, and modifying calibration constants for the various detector components.
- There are several times associated with any set of data.
 - ▶ Time that the data was taken
 - ▶ Various times at which they were calibrated
 - ▶ Various times at which a declaration is made about which constants should be used for a given set of data
 - ▶ Only this latter meaning is relevant for this database discussion

Tables and their relations



Arrows point to table being referenced. Table at source of arrow contains keys identifying a row in the referenced table.

Definition of *assignment* table

Column Name	Column Type
id	int
time	timestamp
runRangeld	int
constantSetId	int
variationId	int
commentId	int

Definition of *runRange* table

Column Name	Column Type
id	int
name	varchar
runMin	int
runMax	int
commentId	int

Definition of *constSet* table

Column Name	Column Type
id	int
constTypeId	int
data	blob
commentId	int

Definition of *variation* table

Column Name	Column Type
id	int
name	varchar
parentId	int
parentTime	datetime
commentId	int

Definition of *constType* table.

Column Name	Column Type
id	int
name	varchar
rows	int
columns	int
directoryId	int
commentId	int

Definition of *directory* table

Column Name	Column Type
id	int
name	varchar
parentId	int
commentId	int

Definition of *columnName* table

Column Name	Column Type
constTypeId	int
name	varchar
number	int
type	enum

Logic of the tables

- Central table is created as a join of the assignment, runRange, constantSet, constantType, and variation tables.
- For each row of the assignment table one can construct:
 - ▶ constantType.id
 - ▶ runRange.runMin
 - ▶ runRange.runMax
 - ▶ constSet.data

where constantType.id is the primary index of the constantType table.

- E. g., TOF/offset, from run 10,000 to 12,000, “the constants”
- Diadvantages:
 - ▶ Only one set of calibration constants for a given run can exist at one time.
 - ▶ Changes made to the constants are lost.
 - ▶ Run ranges must be non-overlapping or ambiguities about which constants should be supplied would arise.

Add run range overlaps, history

- For the next step we add the time of constant set assignment:
 - ▶ constantType.id
 - ▶ runRange.runMin
 - ▶ runRange.runMax
 - ▶ constSet.data
 - ▶ constantCorr.time
- E. g., TOF/offset, from run 10,000 to 12,000, “the constants”, 12/25/2015, noon
- Now the run range data can specify overlapping ranges.
- In case of overlap the constants that go with the most recent time are taken.
- Never delete old assignments \Rightarrow history mechanism:
 - ▶ Constant set assignments that were valid at any given time can be reproduced by only accepting rows that existed before that time.
 - ▶ In this way the state of the table at previous times is preserved and can be accessed.

Add variations

- We add another column marking a variation of the assignments:
 - ▶ constantType.id
 - ▶ runRange.runMin
 - ▶ runRange.runMax
 - ▶ constSet.data
 - ▶ constantCorr.time
 - ▶ variation.name
- E. g., TOF/offset, from run 10,000 to 12,000, “the constants”, 12/25/2015, noon, “final calibration commissioning Fall 2015”
- Now constants sets are assigned only for particular variations
- Variations are in an hierarchy
- Each variation will only deal with a relatively small number of constant set assignments.
- If runs or constant types are requested of a variation that are not assigned within that variation, then the parent variation is queried, recursively, until a valid constant set assignment is found.

Constant Types

- Constants stored as “blobs”
- Internal blob is a 2-D array
- Each column has a particular type: float, int, string, etc.
- Column labels given in columnName table

Directories

- The constType.id is the primary key for the constType table.
- User requests come in the form a full "path" specifying the name(s) of one or more nested directories and constant type. For example:
 - ▶ CDC/vdrift
 - ▶ TOF/FADC/pedestal/method1
 - ▶ BCAL/MeVperADCCount/method1
- Directory table contains information on the hierarchy.