EUROPEAN SPALLATION SOURCE

Accelerator Division

ESS AD Technical Note
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A Draft Version of the Parameter Database

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The parameter list primary serves as a tool to administrate parameters and their values. The main objective is to resolve inconsistencies to ensure that everyone involved in the project is working on the the same solution. The parameter list could however also be useful as a repository for parameters in general and as a source to find the valid parameters. This requires that the parameter list will be regularly updated (alive) and easy to administrate and access.

The present approach of distributing xls parameter lists as presented in reference [1] has the advantage of being simple. However, the number of tables and parameters are expected to increase as the project is evolving. To improve for administration of the parameters in a longer perspective a parameter database system is proposed. To what level it should be integrated with the model, wire frame and naming conventions at ESS is still an open question.

The database should preferably be structured so that it can be adopted by target and instruments. This requires analysis of the target and instrument parameter structures that has not yet been taken into consideration.

1 Relational tables

The database is made up by four relational tables: Sections, Systems, Parameters and Values as shown in fig 1. Sections refer to segments in the accelerator, such as ion source, LEBT, RFQ etc., while Systems refers to ancillary systems, for example rf power source. The reason for introducing both sections and system is that a large part of the parameters in reference [1] appears in more than one table, which should be avoided. Many of the parameter applies to several sections and systems, which can be seen in for example the Infrastructure Service parameter table and the rf system parameter table in [1].

1.1 Sections

The Accelerator is divided into Sections at different levels as listed in table 1 where Accelerator, Target and Instruments accounts for the highest level. N1 and N2 define the hierarchy and the internal order of Sections, which is used for filtering and sorting purposes. The implementation of hierarchy and numbering should however be discussed.

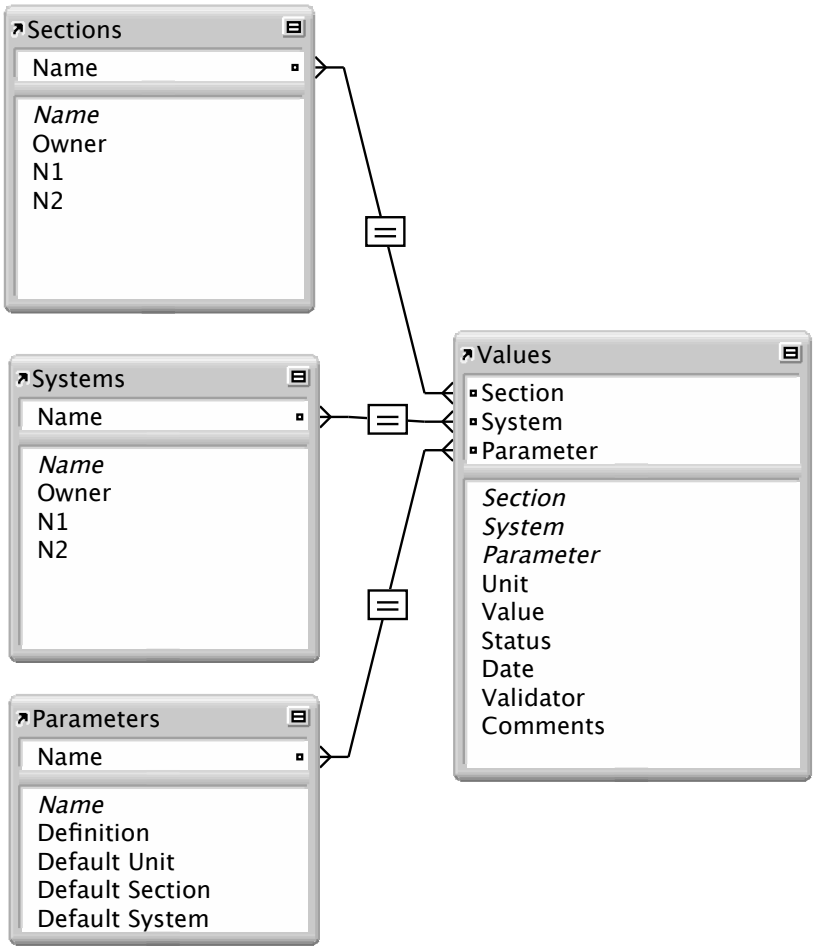

Figure 1: The database is made up of four relational tables

Table 1: Sections

Name	Owner	N1	N2
Accelerator	M. Lindroos	1	0
Ion source	L. Celona	1	1
LEBT	L. Celona	1	2
RFQ	B. Pottin	1	3
MEBT	I. Bustinduy	1	4
DTL	A. Pisent	1	5
Spoke	S. Bousson	1	6
Elliptical low beta	G. Devanz	1	7
Elliptical high beta	G.Devanz	1	8
HEBT	S. Pape-Moller	1	9
Target		2	0
Instruments		3	0

If required, a section ESS can be added as a zeroth level ($N1 = N2 = 0$) to include site wide parameters, such as the total power consumption or availability.

At a later stage it might be convenient to introduce a third level in the table. Although the parameter database is not the appropriate tool for administration of lattice parameters (these reside in the lattice database), the parameter database could be useful as a repository for parameters not included in the lattice data base, example the rf power sources associated to each of the accelerating cavities.

1.2 Systems

The structure of the accelerator Systems table is the same as for the Sections, as shown in table 2. The Systems include the parameter tables in [1] that are not covered by the Sections in table. 1. In the data base all the parameters are assigned to one Section and one System. Therefor the system Overview has been introduced so that parameters that appears only in one table in [1], such as Peak current in the Ion source table, will have a system assigned to it. By default Overview has no owner, these parameters belongs to the Section Owners. (Note that the High level parameters table could equally well be defined under section Accelerator and system Overview.)

In the case target and instruments will be included, the Infrastructure and Services table should be split up so that Electrical systems, HVAC etc also cover target and instruments. Other systems that needs to be added are instruments, magnets, power supplies, control systems, radiation safety, etc....

1.3 Parameters

The reason for introducing a separate Parameter table (table 3) is to facilitate for control over parameter names and units. How to do this in detail needs to be defined. Fields

Table 2: Accelerator Systems

Name	Owner	N1	N2
Overview		0	0
High level parameters	M. Lindroos	1	0
Lattice and Accelerator Science	S. Peggs	2	0
Infrastructure and services	J.Eguia	3	0
Electrical systems		3	1
Vacuum systems		3	2
HVAC systems		3	3
Auxiliary systems		3	4
Cooling systems		3	5
Cryogenics systems		3	6
RF systems	R. Ruber	4	0

Table 3: Parameters

Name	Definition	Default Unit	Default Section	Default System
Geometric beta	Text...		Accelerator	Lattice...
Section length	Text...	m	Accelerator	Lattice...
Klystron power	Text...	MW	Accelerator	RF Power

beginning with Default are useful for speeding up data entry in the Values table for parameters that apply to several Systems or Sections. Additional fields can be added upon request to include for example physical quantities (to impose unit controls) or mathematical symbols.

System and Section owners are allowed to add parameters in the table.

1.4 Values

The table Values uses the same structure as the present parameter tables in [1], except that Section and System fields have been added.

Each record in the Values List is identified by the combination of its Parameter, System and Section names, i.e., through the relationship. This implies that each record in the Value table needs to have a unique combination of Parameter, System and Section names. All the parameter tables in reference essad7 can be reproduced as views or reports by filtering Section, System and Parameters.

Additional fields can be added upon request to include for example keywords (to allow personal lists), links to supporting documents, dependencies etc.

A section owner has the right to add records in the Value table, assign validators and edit draft values in its own section. However, only the system Overview can be selected. A section owner can also leave the system field blank, which will allow for any system owner to take over this parameter.

A system owner has the right to add records in the Value table, assign validators and edit draft values in all sections, but only in its own system.

The validators have no administrative rights as the System and Section owners have. Their role is to validate (and comment) the values proposed by the System and Section owners.

References

[1] S. Peggs et al. ESS-2010 Baseline parameters - a snapshot. Technical Report ESS/AD/0007, 2010. `http://eval.esss.lu.se/cgi-bin/public/DocDB/ShowDocument?docid=24`.