Application of a Simple Text Format as a Device Configuration File

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Overview

In the KEKB magnet control system, relational database management system (RDBMS) has been used for the management of the device configuration. Most of the device parameters, such as address of the interfaces, constant parameters of the magnet power supplies, excitation functions of the magnets, limit values for the operation, etc. are stored in the RDBMS. These parameters are used mainly for the macro expansion to generate the runtime EPICS database files. They are also used to configure the higher level application programs. Although this system is flexible, it is heavy to maintain with little man power in the KEKB control group. To reduce the maintenance cost, restructuring of this system is planned. The plan consists of two major changes. One is the reducing data and making data structure simpler. Another is the replacing tools with simpler ones. As the part of the restructuring, the replacement of the RDBMS with simple configuration files is planned. The configuration file has simple text format, which is designed easy to read and easy to modify only using text editor. The design of the format and the development of the tools have been almost completed. Its application to the KEKB magnet control system is also in progress.

(1) About KEKB Control System

KEKB is an asymmetric electron-positron collider at 8 × 3.5 GeV/c for B-meson physics.

KEKB started in operation in Dec.1998.

KEKB accelerator control system:

EPICS-based

More than 100 VME/VxWorks computers as IOC

Several workstations of 4 kinds of platform

PA-RISC/HP-UX,   Alpha/OSF1,

PC-AT/Linux,   Macintosh/OSX

Scripting language SAD and Python are intensively used for the higher level applications.

(2) Oracle RDBMS in KEKB

The data management system based on the RDBMS has been developed.

Oracle has been used as RDBMS.

The magnet control system intensively use the RDBMS.

Major usage is the automatic generation of the EPICS runtime database.

Generation process is described in PL/SQL, which is the extended SQL by Oracle Corporation.

Python applications can access to the RDBMS using "rdbtool" library module.

•It can handle tabular data on memory.

•It has simple interface to the RDBMS to retrieve data.

(3) Maintenance Difficulty

The maintenance difficulty arises for these years.

Unexpected modifications have been accumulated both in data and PL/SQL scripts.

The wiring database is too complex to understand the whole structure.

Version up of Oracle is complicated task. Careful test are necessary to keep compatibility.

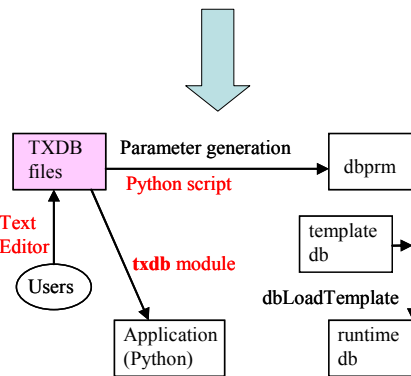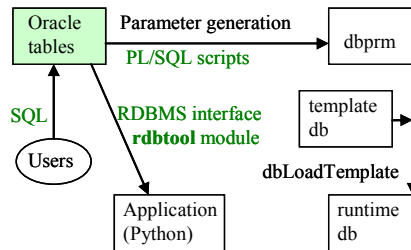The man power of the control group decreases

→ Restructuring is planned.

(4) Restructuring Plan

Restructuring plan consists of 2 major changes.

• Reduce data and make data structure simpler

• Replace Oracle with simple configuration files

The new configuration file called "TXDB" has been developed.

TXDB is a text file and has very simple format.

(5) Design Features of the TXDB

The format of the TXDB is designed with the following guidelines.

Simple syntax

Compact notation

Human-friendly and good readability

User can directly edit the files with a text editor.

Not necessary to be so general but rather special purpose for the device configuration

(6) Format of the TXDB file

The basic structure:

•The TXDB file consists of a set of records.

•The record is described in one line of the file.

•Each record consists of a set of fields.

•Each field is identified by name (field name) and described with the form *name=value*.

The TXDB allows some compact notations.

Following 3 examples are equivalent.

a) Basic format

```
name=QF  loc=D08 port=11 SN=L15-001 table=MagnetPS
name=QD  loc=D08 port=12 SN=L03-002 table=MagnetPS
name=QC1 loc=D08 port=13 SN=S07-012 table=MagnetPS bp=Yes
name=QC2 loc=D08 port=14 SN=S08-015 table=MagnetPS
name=QR1 loc=D11 port=26 SN=S21-103 table=MagnetPS
name=QR2 loc=D11 port=27 SN=S21-118 table=MagnetPS limit=380
name=QR3 loc=D11 port=28 SN=S21-073 table=MagnetPS
```

b) Block notation --- compact

```
%block loc=D08 table=MagnetPS
 name=QF  port=11 SN=L15-001
 name=QD  port=12 SN=L03-002
 name=QC1 port=13 SN=S07-012 bp=Yes
 name=QC2 port=14 SN=S08-015
%block loc=D11 table=MagnetPS
 name=QR1 port=26 SN=S21-103
 name=QR2 port=27 SN=S21-118 limit=380
 name=QR3 port=28 SN=S21-073
```
block

block

c) Column list notation --- more compact

```
%columns  name  port  SN
%block  loc=D08  table=MagnetPS
 QF   11  L15-001
 QD   12  L03-002
 QC1  13  S07-012  bp=Yes
 QC2  14  S08-015
%block  loc=D11  table=MagnetPS
 QR1  26  S21-103
 QR2  27  S21-118  limit=380
 QR3  28  S21-073
```
field names

field values

(7) TXDB and Python

Python applications can handle the TXDB format files using "txdb" library module.

The txdb module is designed being similar to the rdbtool module.

Therefore porting from the rdbtool to the txdb is expected to be easy.