Antares
database
Overview

Kay GRAF
on behalf
Arnauld
ALBERT

Antares database Overview

Kay GRAF on behalf Arnauld ALBERT

January, 30th 2013

Thanks, kay, to present for me.

- computing framework
    - RDBMS choice
    - Hosting
- DB design
- access way
    - oracle user policy
    - web interface
- conclusion

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introduction

- each particle physics and astro-particle physics experiments manage and generate a lot of data from different types
  - hits data during run
  - construction data,
  - environmental measurements
  - . . .

How to store such data ?

For run data, root file, usual format of scientific data in our domain, but for the other type ?

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Data Base

Definition

A database is an application that manages data and allows fast storage and retrieval of that data.

This mean, that we could store huge amount of data, organize and structure them, create relations between data ...

antares database purpose

Antares Database have been designed to store every kind of data around detector excepted hits data from runs.

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Relational DataBase Management Server (RDBMS)

software whichs manage database and provide relationnal way
to access data.

possibilities of RDBMS :

- Oracle, Postgresql, mysql

Choice of Oracle from version oracle 8i in 2001 (start of antares
DB) to version oracle 11g actually

- robust, reliable
- support large amount of data and numerous parallel
  connections
- already used by other particle physics experiment like CMS,
  ...
- provided and supported by the Centre de Calcul at Lyon

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computing hosting at the Centre de Calcul

- cluster 4 computers (bi processor quadri core 32Gb of RAM)
  - 2 servers dedicated to 8 experiments Antares included : min cpu for antares is $15\% = 2.5$ core
  - 2 servers for diverse uses and for high disponibility.
- load balancing of access through the 2 servers
- data storage system : 5 disk in disk bay in RAID 5 with spare disk : support loss of 2 disks
- backup policy : incremental backup
  - complete backup each saturday
  - incremental backup each other day of the week

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database design summary

- 1 tablespace, 334 tables, 93 view
- more than 700 Gb of data
- 8 set of tables in one scheme
  - general data, like users list, product list, PBS, ...

- Red sets will be describe. Others are really specific and are stand alone set of tables

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  - calibration data

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  - configuration data
  - calibration data
  - monitoring data and slow control data pooling

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database
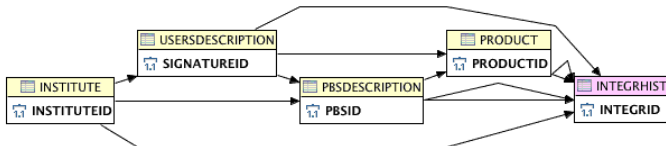Overview

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database design summary

- 1 tablespace, 334 tables, 93 view
- more than 700 Gb of data
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  - general data, like users list, product list, PBS, ...
  - construction data : integration, test data, product history
  - configuration data
  - calibration data
  - monitoring data and slow control data pooling
  - clock data
  - junction box data
  - GRB data
  - divers tables for specific purpose (like summer/winter time, ...)
- Red sets will be describe. Others are really specific and are stand alone set of tables

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general data design

purpose

contain all list tables

- **usersdescription** : list all users
- **institute** : list all antares member institute
- **pbsdescription** : list whole Product Breakdown Structure of antares
- **product** : list all product of antares, physical or logical ones

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construction design

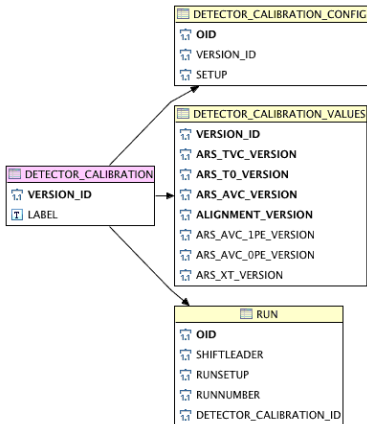## purpose

logical building of detector and product book keeping

- integrhist : store all pair container/content
- prodhistory : list all kind of event for each product
- many views have been created to display detector structure for many kind of product
  (view is a different way to present data)

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calibration design

purpose

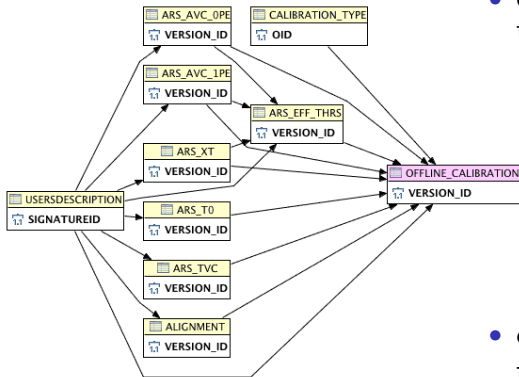store online and offline calibration for each important part of the detector.

- online calibration : 3 tables
  - generic info detector_calibration
  - choice specific setup detector_calibration-values
  - link to runsetup detector_calibration_config

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purpose

store online and offline calibration for each important part of the detector.

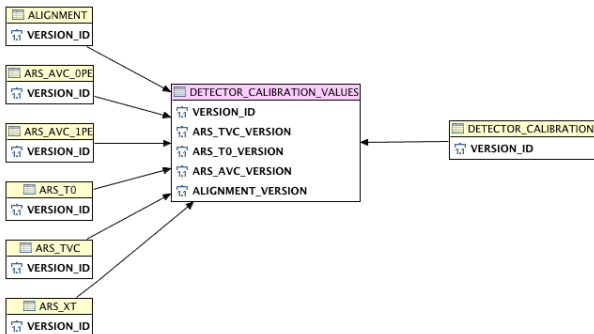- online calibration : 3 tables
    - generic info detector_calibration
    - choice specific setup detector_calibration-values
    - link to runsetup detector_calibration_config
- offline calibration table : to select each specific calibration table

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calibration design

Tbles containing specific setup for each kind of informations are the same for offline and online calibration

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configuration design

purpose

Store all configuration parameters values and associate to run.

- layer 1 : run data
- layer 2 : generic runsetup informations
- layer 3 : specific setup : settings for each kind of detector elements
- layer 4 : configuration data

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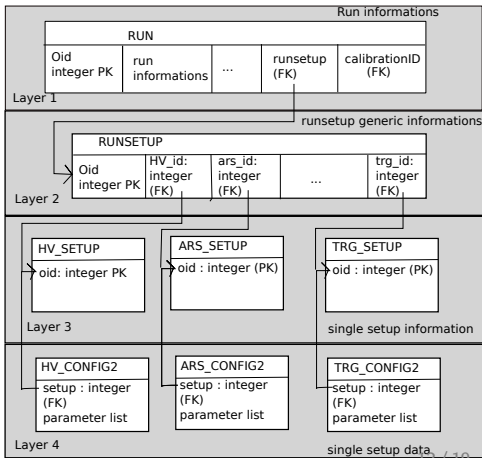construction
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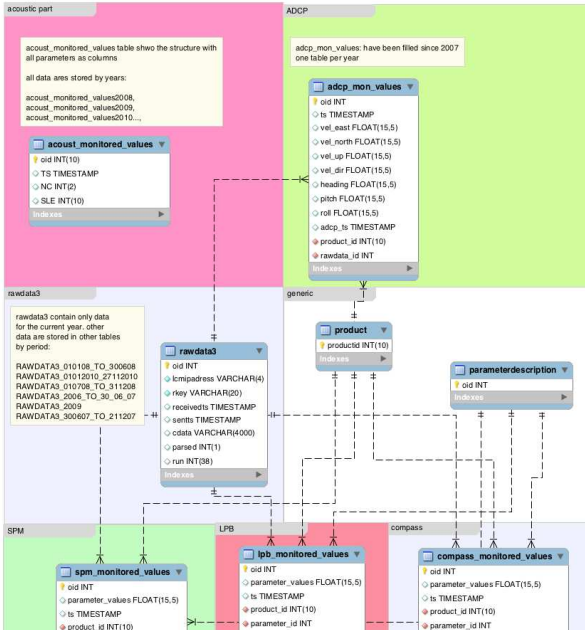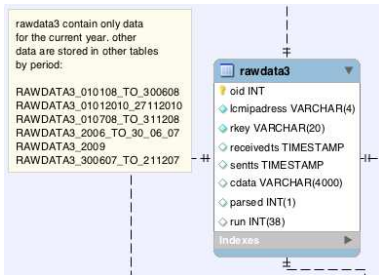**monitoring**

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monitoring design

rawdata3 contain only data
for the current year. other
data are stored in other tables
by period:

RAWDATA3_010108_TO_300608
RAWDATA3_01012010_27112010
RAWDATA3_010708_TO_311208
RAWDATA3_2006_TO_30_06_07
RAWDATA3_2009
RAWDATA3_300607_TO_211207

rawdata3

oid INT
lcmipadress VARCHAR(4)
rkey VARCHAR(20)
receivedts TIMESTAMP
sentts TIMESTAMP
cdata VARCHAR(4000)
parsed INT(1)
run INT(38)
Indexes

- rawdata3 table :
  temporary storage of data
  before parsing

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monitoring design

- rawdata3 table :
  temporary storage of data
  before parsing
- parsed data split in
  dedicated tables
  - compass data
  - local power box data
  - acoustic data
  - instrumented line data

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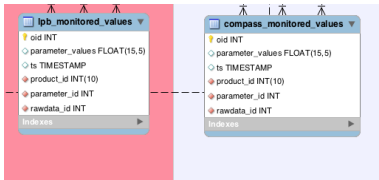monitoring
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Oracle user policy

In order to secure access, Three kind of user have been created on oracle :

antares : DBmanager access.

restricted access : only experts

- own all tables
- could make any modification on design, create , alter or remove tables
- insert, update or delete data

ant_write

user could access all tables in read/write mode. no modification on design allowed data

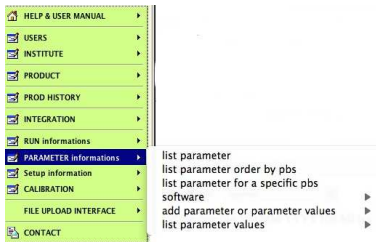### ant_read

user could on access data in read mode. better choice in most case of database access.

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web interface

purpose

provide an easy way to read and insert data.

- more than 100 pages.
- CGI perl script
- cover most of the topics of DB
  - allow read data,
  - insert data through form,
  - insert data data using file upload,

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retrieve information

- detector element mapping

COMPASS AND TCM2 CARDS MAPPING

LINE	STOREY POS	LCM_IP	COMPASS MB (OID)	TCM2 CARD (OID)
1	0	1080	5.0080 (4611317)	1.0073_19696 (4611968)
1	1	1624	5.0096 (4611333)	1.0052_19735 (4583842)
1	2	1631	5.0083 (4611320)	1.0077_19729 (4611972)
1	3	1622	5.0060 (4611298)	1.0076_19826 (4611971)
1	4	1641	5.0075 (4611312)	1.0049_19643 (4583839)
1	5	1625	5.0076 (4611313)	1.0084_19809 (4611979)
1	6	1627	5.0045 (4595156)	1.0074_19732 (4611969)
1	7	1645	5.0084 (4611321)	1.0051_19703 (4583841)
1	8	1626	5.0067 (4611304)	1.0053_19750 (4583843)
1	9	1643	5.0081 (4611318)	1.0018_19658 (4583807)
1	10	1620	5.0063 (4611300)	1.0041_19642 (4583830)
1	11	1637	5.0072 (4611309)	1.0030_19747 (4583819)
1	12	1632	5.0074 (4611311)	1.0046_19706 (4583835)
1	13	1638	5.0079 (4611316)	1.0036_19736 (4583825)
1	14	1629	5.0064 (4611301)	1.0088_19712 (4611983)
1	15	1628	5.0095 (4611332)	1.0086_19694 (4611981)

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retrieve information

- run informations

INFORMATION ABOUT RUN

select b.oid, a.name, to_char(b.runstart,'DD/MM/YYYY HH24:MI'), TRUNC((b.runstop-b.runstart)*24*60), b.runcomment, b.events, b.bytes, b.runnumber, b.filename, b.runsetup, c.setupname, c.oid, d.label from antares.run b,antares.usersdescription a , antares.runsetup c, antares.detector_calibration d where a.signatureid = b.shiftleader and c.oid=b.runsetup and d.version_id=b.detector_calibration_id and runsetup in (107968070) order by b.runnumber

RUN NUMBER	START DATE	RUN DURATION (min)	SHIFT LEADER	NUMBER OF EVENTS	FILE SIZE	RUN SETUP	data quality link	online detector calibration used
68522	21/12/2012 08:38	127	PRADIER	71655	1395054273	Line 1-12 Physics Trigger 3N+2T3+K40+TS0 SNbuffer Dec2012 (L1 Taming) SCAN		2012:V2.2
68524	21/12/2012 10:47	61	PRADIER	33327	676392759	Line 1-12 Physics Trigger 3N+2T3+K40+TS0 SNbuffer Dec2012 (L1 Taming) SCAN		2012:V2.2
68527	21/12/2012 13:48	114	PRADIER	72946	1342807844	Line 1-12 Physics Trigger 3N+2T3+K40+TS0 SNbuffer Dec2012 (L1 Taming) SCAN		2012:V2.2
68542	22/12/2012 12:02	158	PRADIER	91039	1730415542	Line 1-12 Physics Trigger 3N+2T3+K40+TS0 SNbuffer Dec2012 (L1 Taming) SCAN		2012:V2.2

- product history, configuration,...

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insert data

- insert using form

Navigation menu

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PBS LIST

Information about previous integration for OM

OM serial ID : .00841

affichage

INTEGRATION FORM FOR OPTICAL MODULES

Integration Location : APC

User Name : Ageron

Fill the date like DD/MM/YYYY HH:MI (ex : 23/06/2002 12:00)

28/1/2013 15:00

OM serial ID : 2.0194

tick the box for products you want to integrate and select the corresponding serial numbers

☑ PHOTO MULTIPLIER PBS number4.1 :

☑ Link between OM and LCM PBS number 4.2 : 0010

☑ OM Glass hemisphere PBS number 4.3.1 : 1.9012

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insert data

- insert using file upload

OM INTEGRATION LISTE FILE UPLOAD

welcome on the web pages for multiple OM INTEGRATION file upload the file upload follow these rules about the format and the content of the file

the file must have the following format

30/09/2005 (1er cas)
OM label;PMT 4.1 label;Link 4.2;OM Glass hemisphere 4.3.1;connector Glass hemisphere 4.3.2;Magnetic Shield 4.4;gel 4.5;BASE 4.6;LED 4.7;date;0;
2.0038;ST 5424;16;3573;3573;765;SR 59814;370665;0314;27/09/2005;
2.0038;ST 5424;16;3573;3573;765;SR 59814;370665;0314;27/09/2005;
2.0038;ST 5424;16;3573;3573;765;SR 59814;370665;0314;28/09/2005;
2.0038;ST 5424;16;3573;3573;765;SR 59814;370665;0314;28/09/2005;(2eme cas)

the date must be coded as DD/MM/YYYY (example 13/05/2003 as May, 13th 2003)

[ ] (Parcourir...)

(GO !)

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conclusion

- database is efficient and cover many topics of antares requirement
- access have been provided, directly or through web interface, to insert and read data.
- work have been started on km3net DB, using experiment from antares and opera (see next talk from Christiano)
- many improvements will be bring to this new work