Database for construction and tests of End Cap Muon chambers.

Richard Breedon, Michael Case
University of California (Davis)
Valeri Sytnik
University of California (Riverside)
Igor Vorobiev
Carnegie Mellon University

Presented by I. Vorobiev
CMS week, CERN
26 September 2001
Systems considered:

- CRISTAL (Objectivity)
- ROOT
- EDMS
- ORACLE
- MySQL
- PostgreSQL

The best choice:

ORACLE at CERN
Oracle was selected by CERN in 80-s.

Long time available and well developed system.

Very good support.

**Many tools**

(like SQL, SQL*Plus, PL/SQL, precompilers (Pro*FORTRAN, Pro*C/C++ ...), JDBC, OAS, iAS, Oracle XML Developer Kit, ...)

Was designed as **RDBMS**

- Relational Database Management System.

Information - in **Tables**
Since version 8 - new features.

Unstructured data - LOB (Large OBjects (up to 4 Gbytes)):

- BLOB (Binary Large Objects)
- CLOB (Character Large Objects)
- BFILE (Reference to a file)

Internet access → Oracle HTTP Server.

BLOB + Internet access

↓

Upload and download files.

New coming version 9i - object oriented

Currently in use:
Oracle 8i
Oracle 9i Application Server
ORACLE at CERN

Public Services:

Central Database - General purpose environment
Development Database - Test and deployment of new applications
Case Database - Designer/2000 environment

Private Services:

ALARM Oracle database
CHORUS Oracle database
CRYOGENICS Oracle database
EDMS Oracle database
IT/CS Oracle database
LEP logging Oracle database
LEP measurements Oracle database
REMEDY Oracle database
Radio Frequency Oracle database
SL division development Oracle database
SPS measurements Oracle database
Tape Management System Oracle database
End Cap Muon Database

**Sub Databases**

- 1) Anode boards tests.
- 2) FAST site tests (Final Assembly and System Tests).
- 3) ALCT and CLCT/TMB tests.
- 4) CERN site tests.
- 5) Electronic boards tracking for CSC assembly (MySQL)

**Organization**

Each sub DB has separate account in CERN Oracle Central Database.

**Interconnection**

Mutual access by granting rights.
1. Interactive: SQL*PLUS. SQL, PL/SQL stored procedures.

2. Two tiers: client - server.
   
   **Client:**
   Pro*FORTRAN, Pro*C/C++
   ODBC
   JDBC

   
   **Client:**
   Calls PL/SQL stored procedures by URL addresses
Access through Two tiers model.

CSC test results are collected and viewed at FAST sites with Test Manager. Approved data is sent to central database.

- Database structure (tables in Oracle) is created by independent C++ program.
- Data is sent to Oracle through ODBC driver, installed at each FAST site.
- Graphic files are sent to the Web server. Links to these files are stored in the database tables.
- Data from database is accessed via Web with Java applets and JDBC.
Test Manager interface and example of test
Sample plot of test results
Database access via Web with JDBC

Path of data into Oracle by test manager
Path of graphics results to Web via CORBA

Database access via Web with JDBC

Figure 3 FAST site database setup
Two-Tier Computing Model

Three-tier Oracle9i Application Server Architecture

CMS week
26 September 2001

Database for construction and tests of End Cap Muon chambers. (page 12)
1. The Oracle HTTP Server receives a PL/SQL Server Page request, through Oracle Web Cache, from a client browser.

2. The Oracle HTTP Server routes the request to mod_plsql.

3. The request is forwarded by mod_plsql to Oracle8i PLSQL. By using the configuration information stored in DAD (Database Access Descriptor), mod_plsql connects to the database, prepares the call parameters, and invokes the PL/SQL procedure in the database.

4. The PL/SQL procedure generates an HTML page using data and stored procedures accessed from the database.

5. The response is returned to mod_plsql.

6. The Oracle HTTP Server sends the response, through Oracle Web Cache, to the client browser.
Access scheme

ORACLE

\[ \Downarrow \]

Accessed from **PL/SQL** stored procedures

\[ \Downarrow \]

Accessed from **HTTP Server** (iAS)

\[ \Downarrow \]

**URL addresses:**

http://oraweb03.cern.ch:9000/pls/cms_anode_boards.dev/display.board

http://oraweb03.cern.ch:9000/pls/cms_anode_boards.dev/board_files.board_list?p_board_num=20001

http://oraweb03.cern.ch:9000/pls/cms_anode_boards.dev/board_files.board_select

**PL/SQL Web Toolkit** - facility to create HTML pages.

**Packages:**

**htp, htf** - generate HTML tags

**owa** - subprograms and functions
Access through **Oracle9i Application Server**.

Main mode: **saving files**.

Files contain measurements and results of analysis. Each board - few files (**text (numbers) + pictures**). Pictures can be of any format: jpeg, gif, ps, compressed ps.

**HTML page:** select board number

\[\downarrow\]

list of files for requested board

Click on file name ⇒ **view**
Shift-click ⇒ **save in external file**

Main results and status of boards - in tables.
Netscape access
Database for construction and tests of End Cap Muon chambers. (page 19)
LWP - Library for WWW access in Perl.

$ua = new LWP::UserAgent;
$response = $ua->request(...URL...);
$response->content

JAVA - class URL to access URL-address

To upload files:

Server in C

\[\downarrow\]

Calls Perl script

or

JAVA
Files - universal and flexible mean to save information.

- High portability.
- File is associated with necessary number of keys (easy searchable).
- Contains numbers of any kind and text.
- Accessible everywhere through internet (URL address).
- Can be viewed, saved on disk, printed.
- Can be decoded inside a program and numbers (and text) can be used for analysis.
Many thanks to Eric Grancher and Nilo Segura (CERN Oracle Support Group) for valuable help!