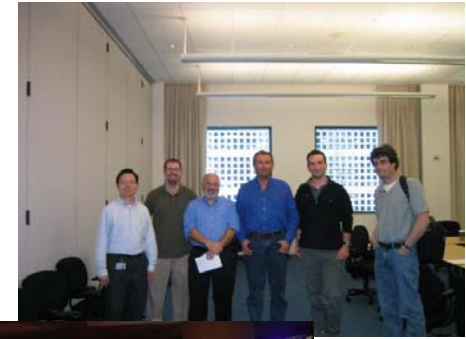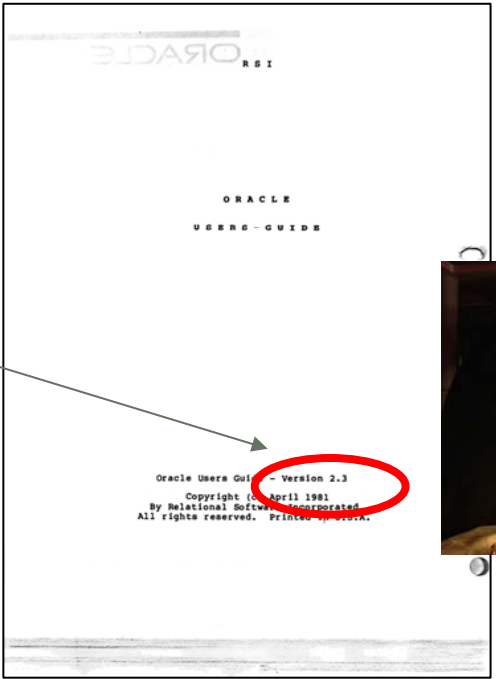ORACLE®

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When Research meets Industry

Stéphane Rousset
Senior Vice-President, Oracle EMEA

LHC Grid Fest, Oct 3rd 2008

26 years of collaboration

- **1982: Oracle 2.3 introduced at CERN**

- **1990's:**
  - More OO approach for Physics applications
  - Commodity HW (Linux)
  - High Availability

- **2003 & the openlab era**
  - GRID and the LHC Computing Grid

CERN Runs
Oracle Human Resources

The LHC Data Challenge

- 15 Petabytes per year
- Worldwide access & distribution
- Over 10+ years of life of LHC

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Grid Computing

ORACLE GRID

Oracle Grid Technology

Environment

- ~280 Database Servers

- ~600 TB Raw disk storage

- RedHat Linux

- 41 Production Clusters

- 24x7 Availability

- To allow resources sharing, maximum availability and location independency
  → **High-Availability, Scalability, Flexibility**

  - Oracle Real Application Cluster (RAC)

  - Oracle Enterprise Manager (OEM)

  - Oracle Automated Storage Management (ASM)

  - Oracle Data Guard

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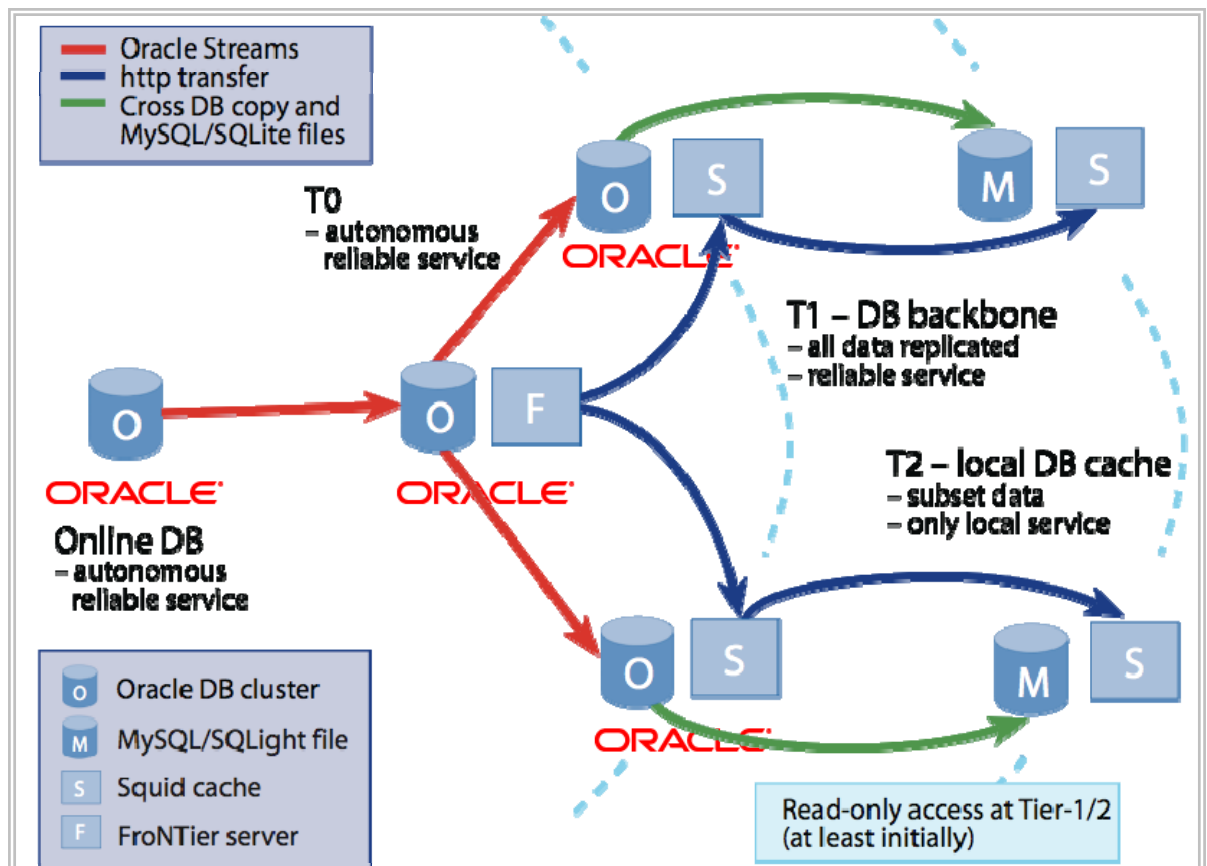# LCG Distributed Deployment of Databases (3D) Project

- A worldwide distributed database infrastructure for LHC

  - Around 120 RAC nodes = 450 CPU cores at CERN
  - Several tens of nodes at 10 T1 partner sites are in production now

- Data Replication and distribution through Oracle Streams

- Performance Monitoring implemented on Oracle Enterprise Manager

- Backup & Recovery with Oracle Data Guard

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… and more!

- ## Alpha and Beta Testing
  – Oracle 11g
  – Oracle Enterprise Manager
  – Oracle Streams
  – New products

- ## Benchmarking

- ## Performance & Tuning
  – PVSS
    - Commercial SCADA application, critical for LHC and experiments
    - Archiving in Oracle Database
    - Tuning Results:
      moving from **100** "changes" per second to CERN needs **150 000** changes per second

ORACLE 11*g*
DATABASE

ORACLE
DATABASE
ENTERPRISE EDITION

ORACLE
ENTERPRISE MANAGER

ORACLE
REAL APPLICATION
CLUSTERS

ORACLE

Business Impact

- # Technology
  - Software enhancements
  - Software testing
  - Creating new Oracle experts (OCP)

- # Customers Interaction
  - Customers Advisory Boards
  - Reference Calls and Visits
  - Best practices

- # *From R&D to Innovation: Future Business Opportunities* event
  (Feb.2008)
  - Opportunities 50 senior leaders from customers, partners, business schools, European Commission
  - Round Table on issues preventing optimal interaction between Industry and Science/Academia

CERN-Oracle Partnership

- Long-term
- Trust
- Openness

- **CERN openlab is the right framework**

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