

OODBMS - Objectivity

An astronomical assessment of OODBMS Objectivity

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Data Base Management Systems

- Two families :
 - Relational DBMS : based on tables

K	A	B	C

→

K	D	E

Oracle, Sybase, Informix, ...
 - Object oriented DBMS : based on objects

Objectivity/DB, O2, Versant, ...

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Object DataBase Management Systems

A DBMS managing the storage of objects

A DBMS offering the properties :

- of object oriented languages : classes, methods, inheritance, object identifier
- of DBMS :
 - data definition language and query language
 - transactions, concurrent access and updating mechanisms
 - data integrity, security, backups

An object oriented language allowing objects to be persistent from one execution to another

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OODBMS : standardisation

No real standardisation, but :

- The Object Management Group (OMG) develops OODBMS standards (ODMG 2.0) :
 - Object Definition Language (ODL)
 - Object Query Language (OQL)
 - Object Interchange Format (OIF)
 - Standard interfaces (API) with C++, Smalltalk et JAVA
- SQL3 extends the relational query language to object management.

www.odmg.org

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Objectivity/DB

- Developed by Objectivity Inc, Mountain View, CA
- Used by several cellular phones companies and web vendors
- Adopted by the CERN for their very large database projects (RD45 project: <http://www.info.cern.ch/asd/rd45>)
- Used for several projects in Astronomy :
 - SLOAN : CCD survey of one quarter of the sky
 - GSC II : Guide star catalogue II (COMPASS)
 - DPOSS II : Digital Sky Survey (Caltech)
 - EIS : ESO Imaging Survey
 - TERAPIX : Megacam project (SAP/IAP)
 - CDS : Very large catalogue management, Simbad (prototype)

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Objectivity/DB in a few words

- An Objectivity database is a federation of distributed databases.
- It shows good performances and scalability.
- It has a transparent client/server architecture.
- APIs available for the following languages: C++, JAVA and Smalltalk. Accepts also SQL++ query language.
- User defined classes are made persistent through inheritance of the Objectivity class `ooobj`.
- The development of a database application is very close from the development of a regular one.
- Runs on several UNIX flavours and on Windows NT.

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Data Organisation in Objectivity/DB

A hierarchical organisation :

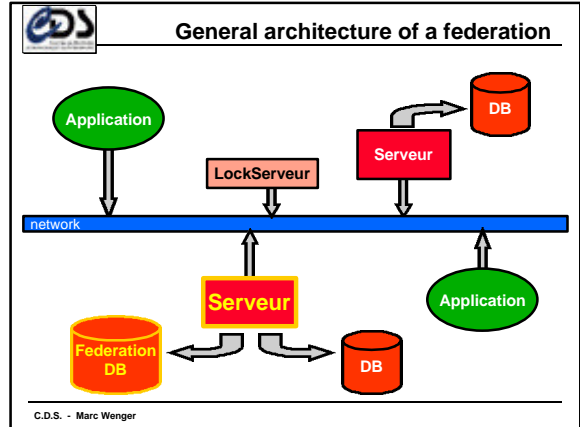
- One federation
- which manages 65535 databases (physical files for the operating system)
- which contain 32767 containers → object clustering
- which are made of 65535 pages of fixed length (1 Ko à 64 Ko)
- which contain at most 2048 objects

logical entity

physical entity

Maximum size	2 Gb files	unlimited file size
volume :	140 Tera-bytes	9.2 Exa-bytes
objects :	4.4 * 10 ¹² objects	288 * 10 ¹⁵ objects

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Conclusion

Objectivity/DB is very powerful to :

- manage huge data volumes in a scalable way
- manage complex and heterogeneous data
- apply object clustering to optimise queries
- be easily integrated in object oriented applications

Experience is building up in astronomy

RDBMS remain interesting :

- in case of simple, tabular data model (i.e. astronomical catalogue)
- more stable companies and 15 years of experience
- possible evolution towards more complex data management

→ *The choice depends on the problem to solve*

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