

MySQL, NOVA, and Access to Primary Numbers

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Primary Numbers

Parameters for Geant geometry

e.g. ATLAS Mother volume:

Name	Value	comment
Version	= 1	95 version
Rmin	= .0	Inner Radius
Rmax	= 1400.0	Outer Radius
Zmax	= 2350.0	Maximum Z

These are name-value pairs

They are structured (structure name ATLS)

Structures are versioned

Parameters have types (int, float,...), comments, units...



Schema Evolution

Evolution of data structures is challenging:

Relational Databases is the technology of choice to address this problem

Relational approach solution:

Internal data representation in the database is not a one-to-one copy of the data user wants to use

(This is opposite to the OO DB baseline approach)

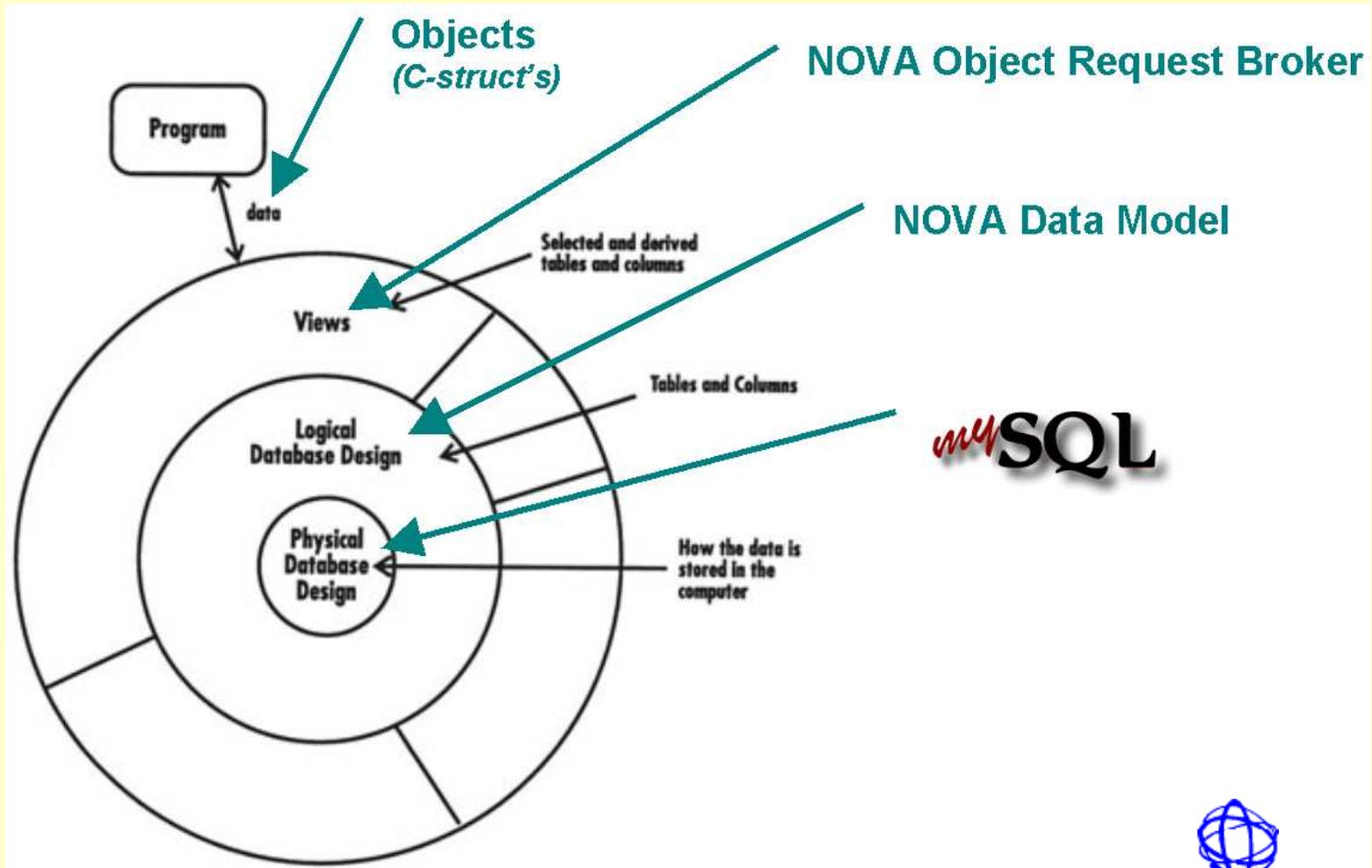
When the structure of user data changes - internal structure of the data in DB is not supposed to be changed

(If achieved, this is considered as a good design)

User data structures are "views"

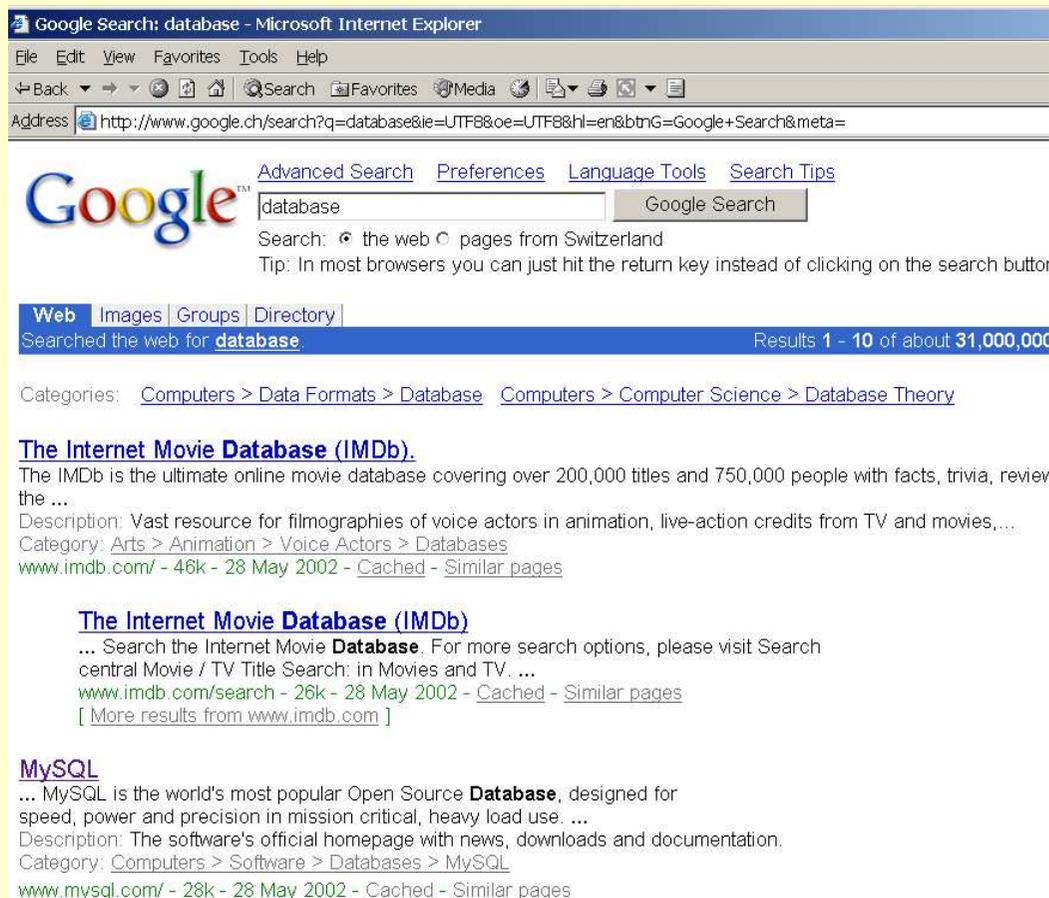


Layered Interface



MySQL

"MySQL is the world's most popular Open Source Database, designed for speed, power and precision in mission critical, heavy load use."



Google Search: database - Microsoft Internet Explorer

Address: <http://www.google.ch/search?q=database&ie=UTF8&oe=UTF8&hl=en&btnG=Google+Search&meta=>

Google Search

Search: the web pages from Switzerland

Tip: In most browsers you can just hit the return key instead of clicking on the search button

Web | Images | Groups | Directory

Searched the web for **database** Results 1 - 10 of about 31,000,000

Categories: [Computers > Data Formats > Database](#) [Computers > Computer Science > Database Theory](#)

The Internet Movie Database (IMDb).
The IMDb is the ultimate online movie database covering over 200,000 titles and 750,000 people with facts, trivia, review the ...
Description: Vast resource for filmographies of voice actors in animation, live-action credits from TV and movies,....
Category: [Arts > Animation > Voice Actors > Databases](#)
www.imdb.com/ - 46k - 28 May 2002 - [Cached](#) - [Similar pages](#)

The Internet Movie Database (IMDb)
... Search the Internet Movie **Database**. For more search options, please visit Search central Movie / TV Title Search: in Movies and TV. ...
www.imdb.com/search - 26k - 28 May 2002 - [Cached](#) - [Similar pages](#)
[[More results from www.imdb.com](#)]

MySQL
... MySQL is the world's most popular Open Source **Database**, designed for speed, power and precision in mission critical, heavy load use. ...
Description: The software's official homepage with news, downloads and documentation.
Category: [Computers > Software > Databases > MySQL](#)
www.mysql.com/ - 28k - 28 May 2002 - [Cached](#) - [Similar pages](#)

Reasons:

- Free
- Fast
- Robust
- Documentation

Google count:

- | | |
|-------------------|-------|
| 1. Oracle | 6.2M |
| 2. MySQL | 4.5M |
| 3. PostgreSQL | 1.9M |
| 4. SQL Server | 1.9M |
| 5. DB2 | 1.1M |
| 6. Informix | 0.9M |
| 7. Objectivity/DB | 0.01M |



Project NOVA

Networked Object-based Environment for Analysis

Status:

BNL R&D project, completed in 2000

Developers:

Nevski, Vaniachine, Wenaus

Features:

Modular components for distributed computing

Use of existing free tools and technologies

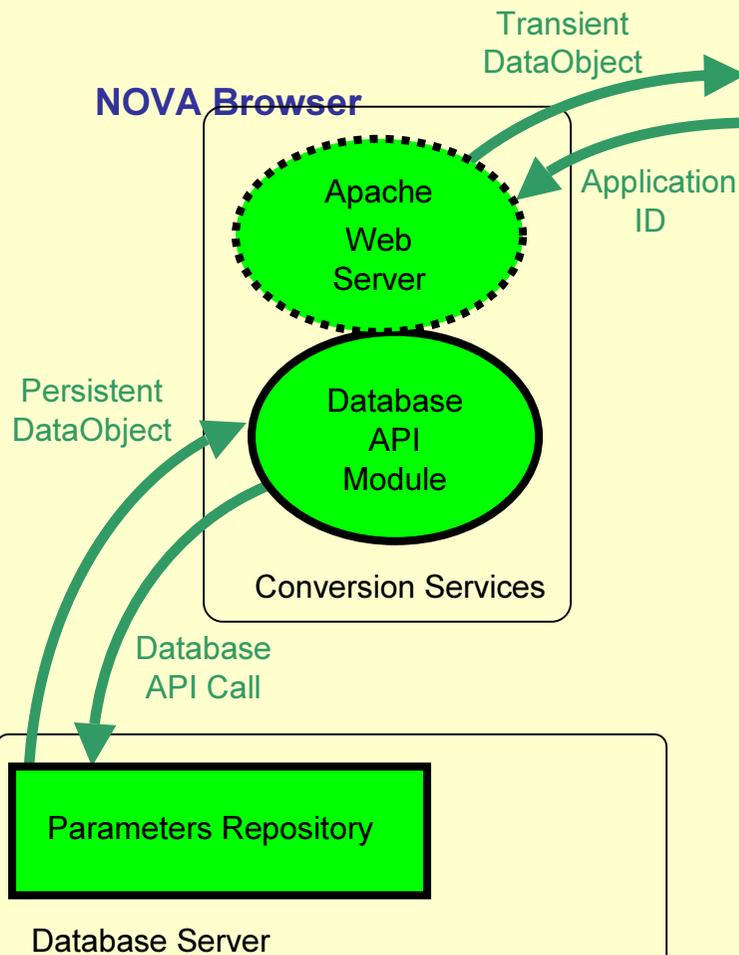
Documentation:

[NOVA presentation at CHEP'2000](#)

<http://www.usatlas.bnl.gov/computing/nova>



Web Navigation



NOVA Database Browser - Microsoft Internet Explorer provided by AT&T WorldNet Service

Address: <http://atlassw1.phy.bnl.gov/NOVA/>

ATLAS

- coil
 - coilgeo
 - coildig
- cops
- cryostats
- em_barrel
- em_endcap
- field
 - mflldgeo
 - forwrdd_cal
 - had_endcap
 - muon
 - pixel
 - sct
 - sity
 - tile_cal
 - tilegeo
 - TILE
 - TILB
 - TIGR
 - SCIN
 - TICG
 - tiledig
 - TDIG
 - trt
 - util
 - atlsgeo
 - ATLS
 - inafgeo
 - pipegeo
 - PIPE

Database directory tilegeo - structure TILB

Module **tilegeo** written by M. NESSI [tilegeo code]
 Module entered database on Thu Jul 8 11:50:08 PM 1999
 Selected structure is of type TILB: BARREL/EXTENDED BARREL SECTION

Total number of TILB structures in this module is 5
 contents of structure 1:

type	name	value	comment
float	SECTION	1	BARREL SECTION
float	NPERIOD	311	NR. OF PERIODS OF BARREL
float	NMODUL	64	NZ OF MODULE IN THE CYLINDER
float	RMIN	229.5	MINIMAL RADIUS ACTIVE (SEE DRAWING TIL30)
float	RMAX	388.5	MAXIMAL RADIUS ACTIVE
float	DZPERIO	1.8	PERIOD TICKNESS
float	DRFRONT	1	TICKNESS FRON PLATE
float	DZEND	2	TICKNESS END PLATES
float	FLANGEX	20	END PLATE FLANGE X
float	FLANGEY	20	END PLATE FLANGE Y
float	ZOFFSET	0	ZOFFSET
float	PHIGAP	0.1	DESIGN GAP BETWEEN WEDGES
float	ISCL_ST	1	FIRST SCINTILLATOR

Total number of parameters in this structure is 13

contents of structure 2:

type	name	value	comment
float	SECTION	2	EXTENDED BARREL SECTION
float	NPERIOD	142	NR. OF PERIODS
float	NMODUL		NZ OF MODULE IN THE C

Remote Application Client



Handling Schema Evolution

Problem:

A user has a new idea that was not foreseen at the beginning. User modifies the structure of one object in his application. Application stores new objects in the database. Remote applications unaware of a new functionality may request objects in old format.

Solution:

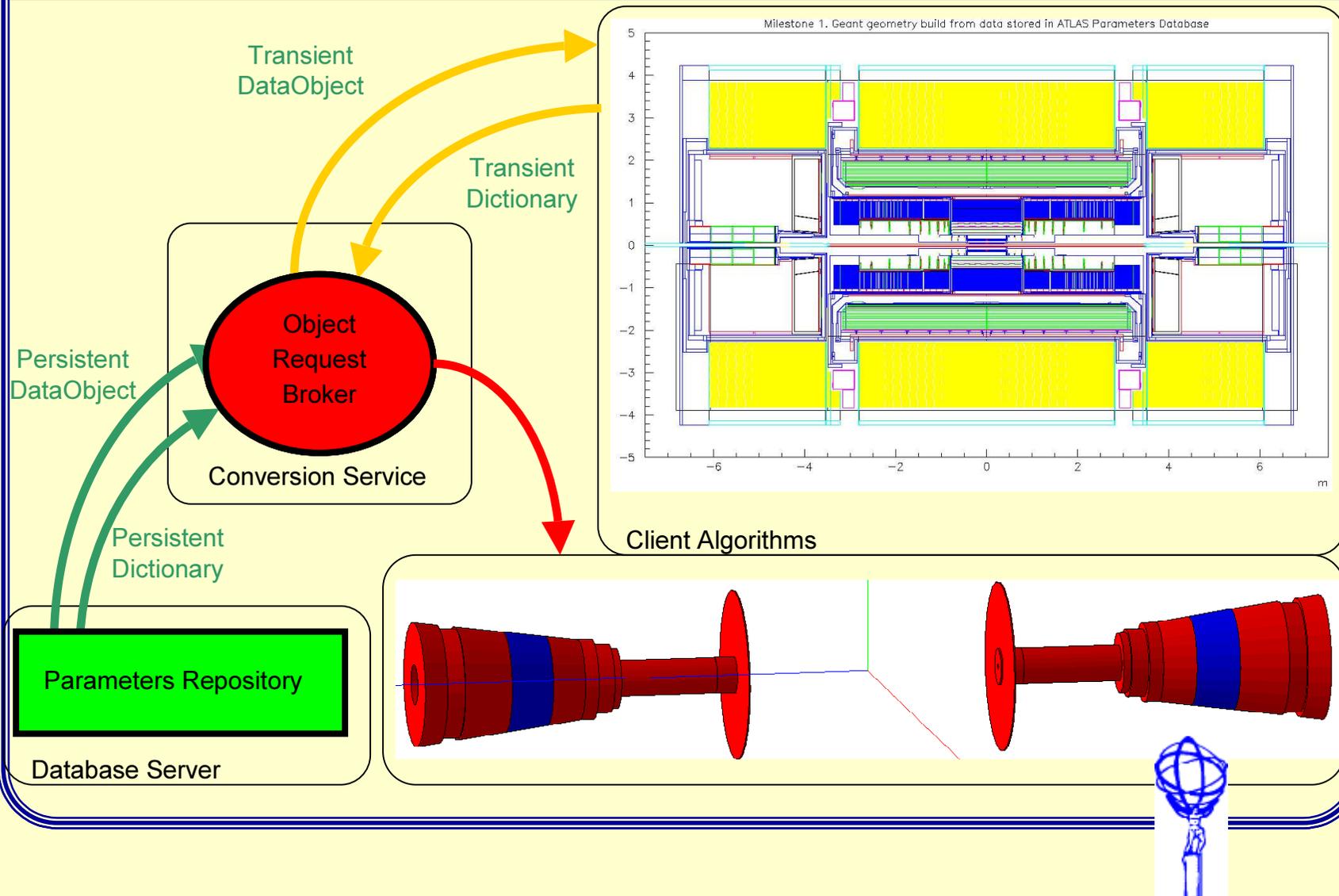
Application: provides metadata request (name, time, selectors...) and the application *DataObject* dictionary

Database server: provides *DataObject* and the dictionary

Object Request Broker module: converts *dataObject* according to the application dictionary



Primary Numbers Access



Forward Compatibility

Benefits:

Separation of database and analysis applications

Robust interface

Database access is independent of application
code version: *user will be able to read new
DataObjects with an old executable*



Status

Used in GEANT3 simulations for parameters (geometry, digitization and reconstruction constants) and binary data (magnetic field,...) (mentioned as "Pavel's MySQL" database)

Adopted as a prototype storage of primary numbers for ATLAS Detector Description (Stan Bentvelsen)

Used for AGDD XML output (MySQL data access developed by Christian Arnault)

Used for Geant4 code development (MySQL data access improved thanks to Andrea Dell'Aqua)



Evolution Strategy

Athena integration:

Connections to Athena services (conversion and conditions and transient stores) need to be defined and implemented

Primary Numbers DB services will be merged with the ConditionsDB services

End-user support:

Can be used on the laptop when disconnected
(MySQL embedded server)

Data can be updated when laptop is connected
(MySQL data replication)



NOVA Data Model

