PROJET HORIZON

Horizon GalMer Database

N-body simulations of galaxy mergers

First Implementation of the SNAP Data Model

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VOFrance Meeting, ObsPM, Paris, 27-Nov-2007

GalMer Database: Science Case

- Simulations of major mergers of galaxies
- Statistical studies of star formation rate and efficiency changes, metal enrichment, kinematics and dynamics of merger remnants, formation of tidal dwarfs etc.
- Simulations of observations of merging galaxies

GalMer Database: Simulations (1)

- Tree-SPH code
- 3 types of particles: Hybrid, Star, DM
- Simulations till 3-3.5 Gyr
- Snapshots every 50 Myr

GalMer Database: Simulations (2)

- 2 giant (yet) galaxies (E0, Sa, Sbc, Sd)
- 120000 particles in each galaxy
- 12 different types of orbits (pericentral distance, relative velocity, etc.) with 2 different orientations of orbital moment with respect to the spin of galaxies
- 4 different inclinations: 0, 45, 75, 90 degrees

GalMer Database: Data (1)

- We trace the following properties:
  - x, y, z, vx, vy, vz, mass (all types of particles)
  - average metallicity (hybrid and star particles)
  - metal enrichment history and star formation history (hybrid parcles)
- FITS binary tables to store the snapshot data (12Mb per snapshot) + FITS tables to store SFH and MEH for hybrid particles (200Mb)

GalMer Database: Data (2)

- 50 to 70 snapshots for ~1000 simulations
- Total volume ~1Tb
- PostgreSQL with native XML support is used to store the Characterisation DM metadata
- Retrieval of integrated SFH using “stored procedure” (pl/pgSQL)

GalMer Database: WEB Access

- Simple DB Query interface
- VO Table output of SFH
- Direct download of snapshot data (FITS)
- Usage of special “service” Java applet to interact with TOPCAT using PLASTIC (PLatform for AStronomical Tools InterConnection) – displaying snapshot files in TOPCAT and 2D FITS maps of various quantities in CDS Aladin

GalMer Database: Services

- Maps generation (mass-weighted)

DATA ANALYSIS (luminosity-weighted)

- Image Generation (using PEGASE.HR)
- Spectra (data cubes) generation (PEGASE.HR)
- Luminosity-weighted LOSVD computation

SNAP

- Simple Numeric Access Protocol by IVOA Theory IG (Lemson et al. in prep.)
- Protocol to access numerical simulations (N-body etc.) and a data model behind it
- Protocol is snapshot-specific (i.e. snapshot selection is out of its scope), although the data model is general enough to handle many different kinds of simulations

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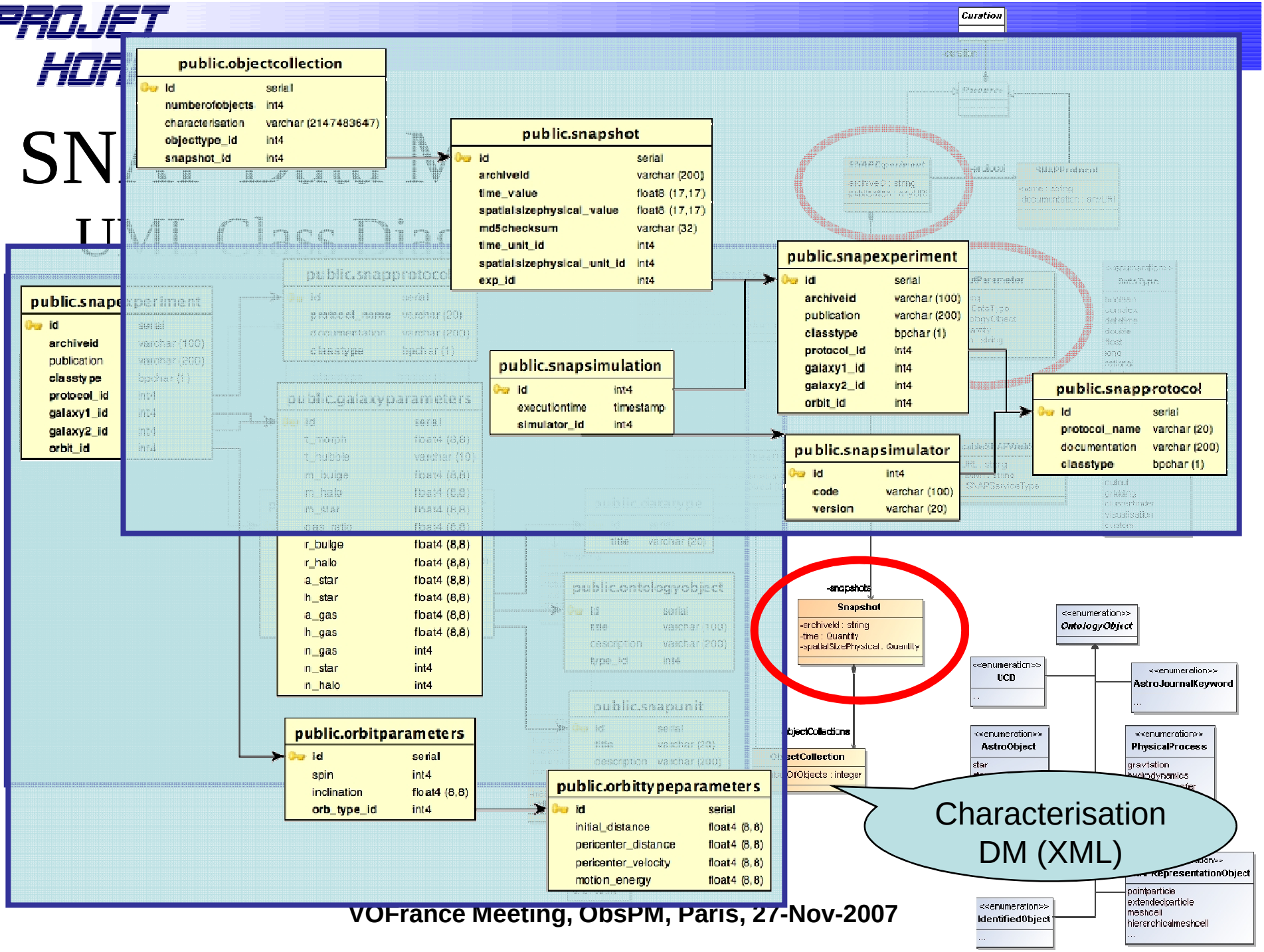
UML Class Diag



Demo...

Some

- PostgreSQL + native XML support (see details in the proceedings of ADASS-XVI, Zolotukhin et al. 2
- Using XPath queries on Characterisation Metadata to constraint the selection (see an application in ... Spectroscopy ...