Data Structures (WG6)

MODEST – Working Group 6
Progress Report

Peter Teuben
University of Maryland
Introduction

• Goals:
  – **ideal**: define a dataformat we all use
  – **practice**: describe a dataformat so it becomes easy to exchange our data

• Done so far:
  – web site with example data (think Virtual Observatory) to gain experience in simulation date types
  – document describing a generic “PointData” dataformat
  – TVO demo at AAS#203
  – TVO whitepaper (Lemson et al.)
Particle Data Storage??

• What properties should a data format have:
  - Exchangeable
  - Archiveable
  - Extendable
  - Portable
  - Scalable

See also:  http://www.astro.umd.edu/nemo/tvo
And:  http://www.manybody.org  (MODEST)
Particle Data

- Tabular vs. Grid Data:
  - Structured grids (AMR)
  - Structured particle (cf. Starlab's t\texttt{dyn})
- Particle-Attribute-Time (PAT) data cube
Particle Data: examples

- **NBODYx**: header + data
- **NEMO**: (binary) structured files
- **FITS**: BINTABLE (Teuben, 1995)
- **HDF**: SDS, Vdata (Bryan & Summers, 1995)
- **VOTable**

The storage of unstructured data is not described here, however HDF has facilities to handle it.
• Different types of particles have different attributes
Particle - Family - SnapShot - Album

- Particle: has various attributes (mass, pos, ....)
- Family: Particles with the same kind of attributes
- SnapShot: a set of Family
- Album: a set of SnapShots

Particles can also nest down to a Family (e.g. Star → SPH-blob)
Unresolved Issues?

- Variable timestep integrators
- Multiple usage of attributes (T, M, ...)
- Data replication ("Greenbank convention")
- Monte Carlo simulations
- Units (Heggie & Mathieu 1986)
- Array attributes (e.g. rho(r), s(r), Z(m), ....)
TODO

• between now and MODEST-5:
  – critique the PointData proposal
  – more examples of data for the archive  
    (NEED HELP – will travel)
  – exchange data ? Do we need to?  
    (some converters exist already between popular packages,  
    e.g. NEMO has a fairly large number of them)
  –
intentional nearly blank slide