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Data

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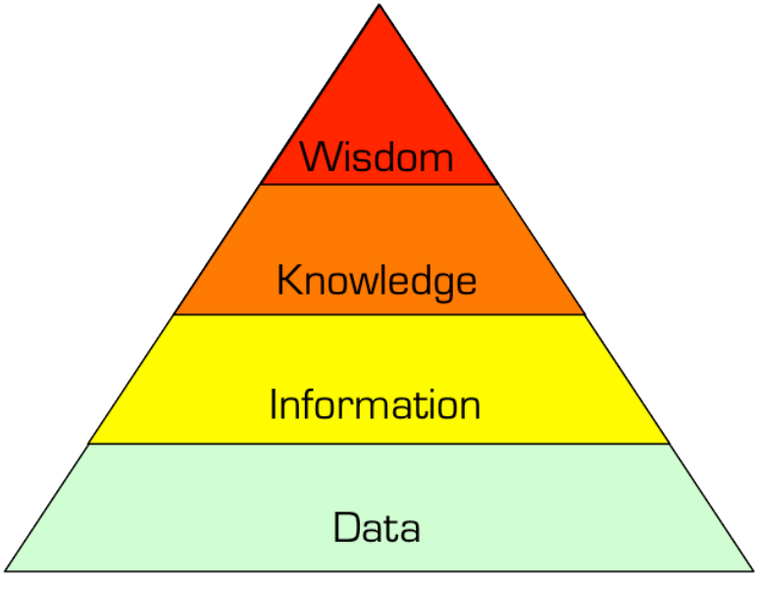
overview

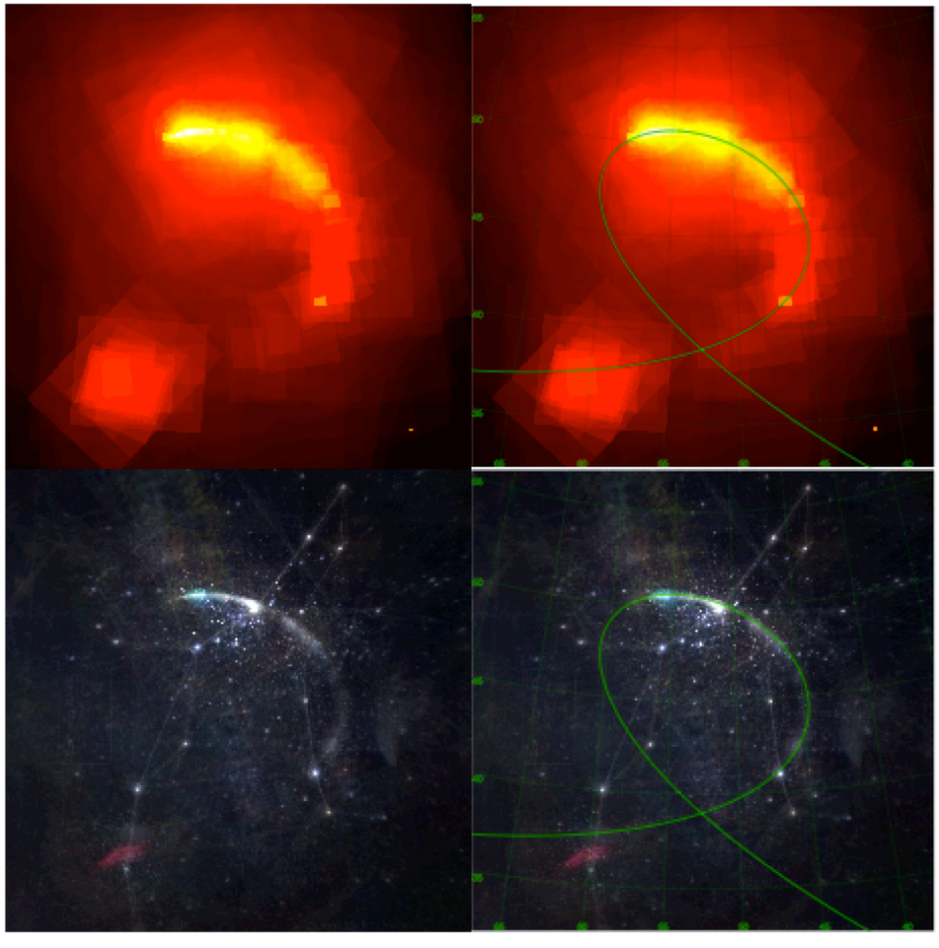
- data
- data models
- relational databases
- sql - the basics
- advanced sql
- alternative databases

what is data?

- Values of qualitative or quantitative variables belonging to a set of items
- Metadata is also data (and arguably more important)



the power of metadata



scale of data

1 Petabyte of data is …

- enough to store the DNA of the entire US population - and then clone them over twice
- over 2000 years of continuous MP3 playback
- 13.3 years of HD video
- one Tweet per person on the planet per day for 7 weeks

but

- 60 nights of LSST data
- 90s of SKA data

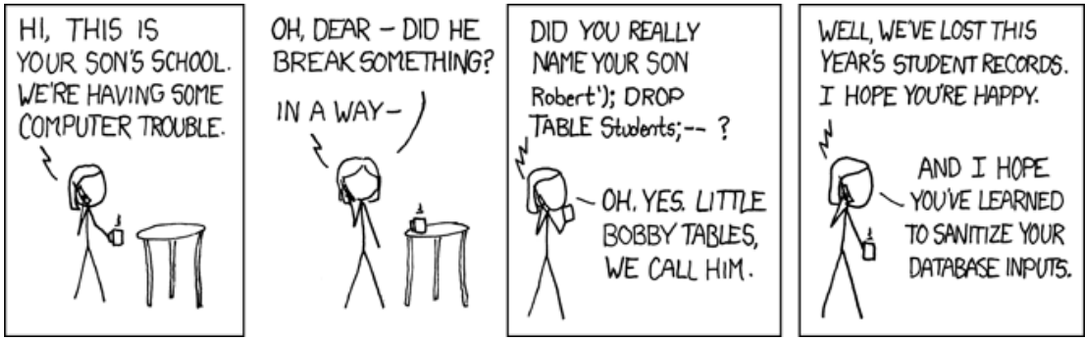
commonplace in the next decade

structured data

- Programmatically we deal with arrays, maps, lists, sets, queues, trees, graphs, …
- No unique solution to working with data - depends on the problem being addressed (and personal preference)
- Data can be regarded as structured or connected

what is a database?

- A structured collection of data residing on a computer system that can be easily accessed, managed and updated
- Data is organised according to a database model
- A Database Management System (DBMS) is a software package designed to store and manage databases



why use a dbms?

- data independence
- efficient and concurrent access
- data integrity, security and safety
- uniform data administration
- reduced application development time
- data analysis tools

scale of databases

- "DBs own the sweet spot of 1GB to 100TB" (Gray & Hey, 2006)
  - SQLite
  - MySQL, PostgreSQL
  - SQLServer, Oracle
  - *Hive/HadoopDB, SciDB, Redis, MonetDB, NuoDB