De-normalising data for archival preservation

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Content

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1. Normalised databases

- Optimised for use
  - Not optimal for reading/querying.
- Designed to avoid redundancies
  - Consistency – avoid anomalies
  - Optimize storage requirements
- Several levels of normalisation

First normal form (1NF)

CD_ID	Album Title	Artist	Published	Track Nr.	Song Title
001	Master of Puppets	Metallica	1986	1	Battery
002	Metallica	Metallica	1991	8	Nothing Else Matters
001	Master of Puppets	Metallica	1991	5	Disposable Heroes
003	Zeitgeist	Smashing Pumpkins	2007	1	Doomsday Clock

Second normal form (2NF)

CD_ID	Album Title	Artist	Published
001	Master of Puppets	Metallica	1986
002	Metallica	Metallica	1991
003	Zeitgeist	Smashing Pumpkins	2007

CD_ID	Track Nr.	Song Title
001	1	Battery
001	5	Disposable Heroes
002	8	Nothing Else Matters
003	1	Doomsday Clock

Third normal form (3NF)

CD_ID	Album Title	Published	Artist_ID
001	Master of Puppets	1986	11
002	Metallica	1991	11
003	Zeitgeist	2007	22

Artist_ID	Artist
11	Metallica
22	Smashing Pumpkins

CD_ID	Track Nr.	Song Title
001	1	Battery
001	5	Disposable Heroes
002	8	Nothing Else Matters
003	1	Doomsday Clock

- Normalised structure is best for usage, if usage means that data is added
  - Easy maintenance of data
- Unbiased regarding search pattern
- (rather) inefficient if data should be retrieved
  - Several/complex queries required to retrieve desired information

Preserve

- What should be preserved/what is important?
  - Only the content? Parts of it?
  - How the content was accessed/delivered?
  - Everything: content, transactions, behaviour?
  - (Maybe you will also need to preserve the application?)

Format normalisation

- Format normalisation != Database normalisation
- Store the database in an open format, suitable for preservation
  - Resemble original structure
  - Keep the content
- SIARD format

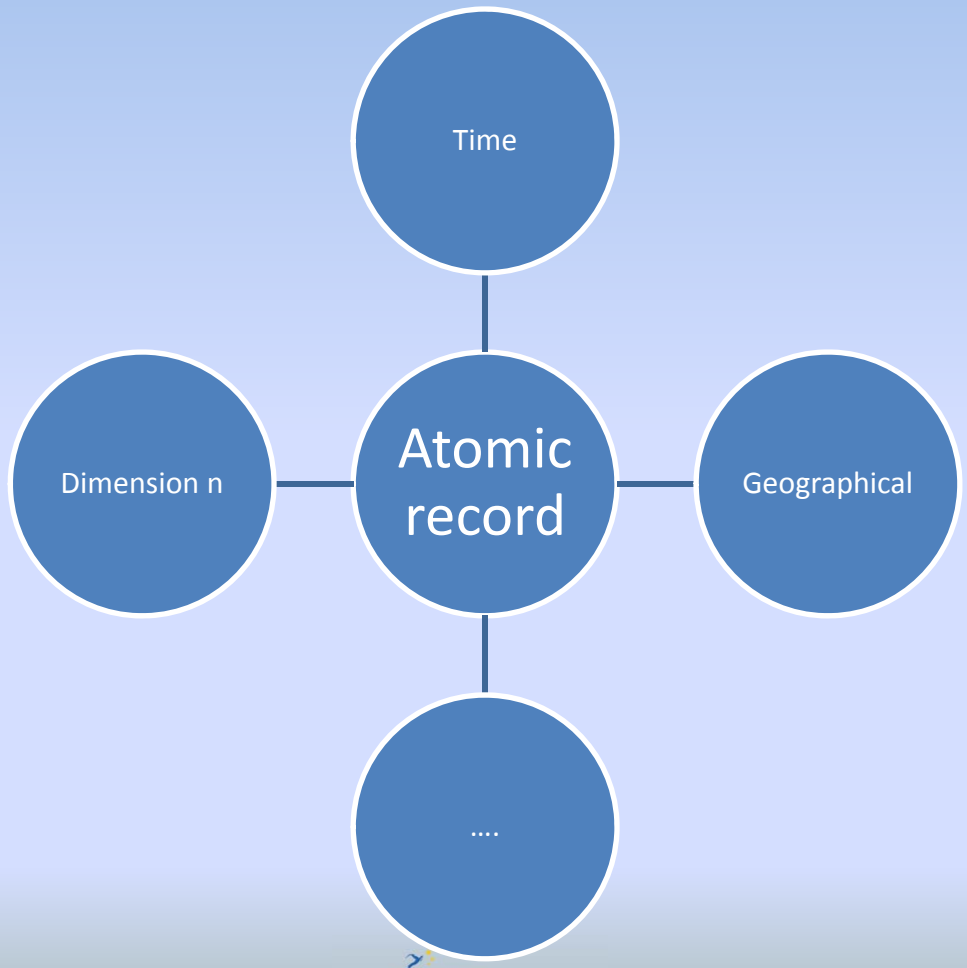
But:

- What happens if information is lost?
  - Tables that are no longer connected?
  - Context/documentation of the database is non-existant or lost?
    - Some Databases/Tables make no sense if you lack information.
- Why not go beyond „simply“ storing the database?

2. De-normalisation

- Time-space tradeoff: improve „read“ performance
  - (re-)introducing redundancy – more storage capacity is required
  - Materialised views: results of search queries stored in tables
  - Reorganize database

Example: Star schema



- Require a certain view of the database:
  - Which information is most important for queries?
  - Can be unflexible for varying analytics.

- Simpler queries + performance gains
- Fast aggregations
- Feed OLAP cubes

De-normalisation - questions

- How to do it?
  - Manually? Automatically? Which view?
- When to do it?
  - During ingest? When access is given? Never?
- How to handle BLOB/CLOB linked/inside the database?

3. Archival context - Problems

- Can be difficult to create
- De-normalisation comes with undesired effects:
  - Original context/structure is lost
  - Rendering authenticity decreases

- De-normalisation != fit for preservation

4. Archival context - Benefits

- Robust: complexity is reduced
  - Easier migration
  - Accessibility increased
- Archiving Service Oriented Architecture (SOA):
  - Database snapshots are useless, if they refer objects that are not going to be stored with it.

- Data mining as part of the lifecycle: dissemination as part of the archiving strategy
  - OLAP

OLAP

- Online Analytical Processing
- Multi-dimensional analytical queries
  - Analyze multidimensional data from multiple perspectives.
  - Get a lot of information very fast.

Thank you!

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