Temporal Databases
INFO-H-415

Université Libre de Bruxelles
MADS Model

- Extends the Entity-Relationship Model (ERM).
  - Refer to a general database course for ERM (e.g. INFO-H-303)
- Spatial and temporal notations.
Temporal Relations

- A relation has a validity interval from `FromDate` to `ToDate`.

- Attributes `FromDate` and `ToDate`.
  - Use a dummy value far in the past for $-\infty$.
  - Use a dummy value far in the future for $+\infty$.

- Candidate keys are:
  - PK
  - PK, `FromDate`
  - PK, `ToDate`
  - PK, `FromDate`, `ToDate`
Intervals

before

meets

overlaps

during

starts

finishes
Operations

- Temporal Join
- Coalescing
- Temporal Difference
- Temporal Aggregation
Temporal Join

Result:

I, J

See slides 16 in the lecture notes
Sequenced version on 111
Coalescing

- Result:

- See slides 91 in the lecture notes
Temporal Difference

Result:

See slides 99 in the lecture notes
Temporal Aggregation

- Find the temporal points of change and build the corresponding interval
- Compute the aggregation over each interval
- Coalesce the result
- See slides 104 in the lecture notes
Temporal Aggregation

\[ \begin{array}{c|c|c|c|c|c}
E1 & D1 & 20 & 30 & D2 \\
E2 & D2 & 25 & D1 \\
E3 & D2 & 30 & 35 & D1 \\
\text{MAX(D1)} & 20 & 25 & 35 & 35 \\
\text{MAX(D2)} & 25 & 30 & 30 & 30 \\
\end{array} \]
Dataset

- Available on
  http://cs.ulb.ac.be/public/teaching/infoh415/tp

- Setup
  - Create a database 'infoh415-<your-netid>-temporal' and select it as the context database
  - Run createtable.sql
  - Run dbload.sql
Exercises

- **First** session:
  - Translate the MADS model into a relational schema
  - Queries 1–9
    - (5): sequenced join (slide 94 of the course notes)
    - (6): sequenced difference (slide 99)
    - (9): coalescing (slide 91)

- **Second** session:
  - End of the queries

- **Third** session:
  - Temporal constraints