University of Zurich[UZH]

Department of Informatics

University of Zürich
Department of Informatics
Binzmühlestr. 14
CH-8050 Zürich
Phone. +41 44 635 43 11
Fax +41 44 635 68 09
www.ifi.uzh.ch/dbtg

UZH, Dept. of Informatics, Binzmühlestr. 14, CH-8050 Zürich

Jasmin Ebner

Prof. Dr. Michael Böhlen
Professor
Phone +41 44 635 43 33
Fax +41 44 635 68 09
boehlen@ifi.uzh.ch

Zürich, 23. September 2015

Vertiefung
Topic: Integrity Constraints in Temporal Ground and Now-Relative Databases

Temporal databases allow keeping track of time-varying data. The valid time of a tuple describes the time range during which the tuple is valid in the real world. The valid time can be either in the past, present, or future. In contrast to temporal ground databases, a now-relative database does not only contain fixed points in time, e.g. the year 2015, but also *Now* as an open-endend, ongoing point in time that evolves over time.

Integrity constraints like primary keys and foreign keys are fundamental concepts in a DBMS. Extending a database to a temporal ground database changes the mechanisms how these constraints need to be ensured: For instance, a temporal primary key constraint ensures that there do not exist two tuples with the same non-temporal primary key attribute(s) **and** with overlapping temporal primary key attribute(s). Extending a temporal ground database to a now-relative database adds the challenge that the valid times of tuples do not only change through modification statements, i.e., insert, update, and delete, but also when time evolves.

In this project, the student should carefully study the two temporal integrity constraints, the temporal primary key and the temporal foreign key constraint, including the scenarios in which violations of these integrity constraints can occur. Additionally, the student should adapt the violation scenarios for ground databases to now-relative databases.

Tasks:

1. Literature study on temporal primary keys and temporal foreign keys [3, 2] and on now-relative databases [1].
2. Determine the scenarios in which the two temporal integrity constraints can be violated.
3. Adapt the violation scenarios to now-relative databases: which of the scenarios for temporal ground databases can still occur in now-relative databases, which additional sce-

narios exist, when can a constraint violation occur, and which resolving strategies might be possible.

4. Write a report.
5. Explain the above issues in an oral exam.

References

[1] Clifford, James and Dyreson, Curtis and Isakowitz, Tomás and Jensen, Christian S. and Snodgrass, Richard Thomas. On the Semantics of Now in Databases. *ACM Transactions on Database Systems*, 1997.

[2] K. Kulkarni and J.-E. Michels. Temporal Features in SQL:2011. *SIGMOD Record*, 41(3):34–43, 2012.

[3] Wei Li and Snodgrass, R.T. and Shiyan Deng and Gattu, V.K. and Kasthurirangan, A. Efficient sequenced temporal integrity checking. In *Proceedings. 17th International Conference on Data Engineering.*, 2001.

Supervisor: Yvonne Mülle (muelle@ifi.uzh.ch)

Start date: 23 September 2015

End date/Oral Exam: 8 December 2015, 15:00

University of Zurich
Department of Informatics

Prof. Dr. Michael Böhlen
Professor