



Universität Zürich

Institut für Informatik

Binzmühlestr. 14
CH-8050 Zürich
Schweiz

Tel. +41 044 635 43 33
Fax +41 044 635 68 09
boehlen@ifi.uzh.ch
www.ifi.uzh.ch/dbtg

Prof. Dr. Michael Böhlen
Database Technology

Informatikvertiefung

Mehmet Ali Bekooglu
Zürichstrasse 51
CH-4665 Oftringen

Matrikelnummer: 06-920-771
email: bekooglu@gmail.com

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Topic: Analysis of Snapshot Isolation

In a database management system (DBMS), concurrency control techniques are used to ensure noninterference resp. isolation of concurrently executing transactions. Those techniques use protocols (set of rules) to guarantee certain properties such as serializability. A popular technique, used in most commercial DBMSs, is to lock data items to prevent multiple transactions from accessing the items concurrently. Widely used are two-phase locking (2PL) protocols such as the strict 2PL protocol. Another set of concurrency control protocols use timestamps.

Besides concurrency control techniques which use only one version of a data item, there are multiversion concurrency control (MVCC) protocols, such as Snapshot Isolation, that maintain multiple versions of a data item.

Within the scope of this work, Snapshot Isolation (SI) shall be described in detail and it shall be compared to locking protocols as well as ANSI SQL isolation levels. Furthermore, a technique to ensure serializable executions with SI shall be analyzed.

Tasks:

- Literature research on Snapshot Isolation, SQL isolation levels and a SI serialization technique [1, 2, 3]
- Write a report of approx. 10-15 pages that includes the following points:
 - Explanation of SI including its operating mode and possible anomalies/limitations illustrated by examples
 - Comparison between SI and locking protocols as well as ANSI SQL isolation levels
 - Explanation of ELM, a technique to ensure serializable SI executions presented by [1]
- Presentation of results (15 minutes)
- Oral exam - content: Multiuser synchronization, SQL isolation levels, SI, ELM



Literatur

- [1] M. Alomari, A. Fekete, and U. Röhm. A Robust Technique to Ensure Serializable Executions with Snapshot Isolation DBMS. In *ICDE '09: Proceedings of the 2009 IEEE International Conference on Data Engineering*, pages 341–352, Washington, DC, USA, 2009. IEEE Computer Society.
- [2] H. Berenson, P. Bernstein, J. Gray, J. Melton, E. O’Neil, and P. O’Neil. A critique of ansi sql isolation levels. In *SIGMOD '95: Proceedings of the 1995 ACM SIGMOD international conference on Management of data*, pages 1–10, New York, NY, USA, 1995. ACM.
- [3] G. Weikum and G. Vossen. *Transactional Information Systems: Theory, Algorithms, and the Practice of Concurrency Control and Recovery*. Morgan Kaufmann, 2002.

Task assignment and Supervisor:

- Christian Tilgner

Starting date: 24.01.2011

Ending date: 23.07.2011

Department of Informatics, University of Zurich

Prof. Dr. Michael Böhlen