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

Anh Pham

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

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Master's Basic Module
Datenbanktechnologie

Topic: Non-blocking linked lists for concurrent access

One technique to make concurrent accesses to data structures faster is to implement them using non-blocking low-level atomic primitives such as compare-and-swap (CAS) operations. The idea is to make concurrent accesses faster by getting rid of the overhead caused by lock-based implementations. However, these data structures need to be implemented carefully to ensure that there are no unintended side effects.

The goal of this Master's basic module is to implement and evaluate a non-blocking linked list as described in [1]. The work is structured into the following tasks with corresponding outcomes and deliverables:

- **T1: Reading and understanding the paper**
  The first task is to read the paper cited above and to understand (in principle) how a non-blocking linked list can be implemented. Based on this, a first design of the implementation can be sketched.
  Outcome: Sketch of the design for the implementation
- **T2: Implementing the data structure and environment**
  The second task is to implement the data structure and the environment that will be needed for the evaluation. Depending on the hardware/operating system that is used, this may entail the implementation of a simulation environment to simulate the CAS operations and the execution of concurrent accesses to the data structure.
  Outcome: An implementation of the data structure and an evaluation environment
- **T3: Experimental evaluation**
  After the first two steps, the goal of the third step is to test the correctness and perfor-

mance of the implemented data structure.
Outcome: Evaluation of the data structure

- **T4: Summarize the findings**
  Finally, the findings should be described and summarized in a report.
  Outcome: A report of about eight pages.

References

[1] T. L. Harris. A pragmatic implementation of non-blocking linked-lists. In *Proc. of the 15th Int. Conf. on Distributed Computing (DISC'01)*, page 300–314, 2001.

Supervisor: Sven Helmer

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Exam: To be determined

Department of Informatics, University of Zurich

Prof. Dr. Michael Böhlen