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# Effect Preservation in Transaction Processing in Rule Triggering Systems*†

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**Abstract**

Rules provide an expressive means for implementing database behavior: They cope with changes and their ramifications. Rules are commonly used for integrity enforcement, i.e., for repairing database actions in a way that integrity constraints are kept. Yet, Rule Triggering Systems fall short in enforcing *effect preservation*, i.e., guaranteeing that repairing events do not undo each other, and in particular, do not undo the original triggering event.

A method for enforcement of effect preservation on updates in general rule triggering systems is suggested. The method derives transactions from rules, and then splits the work between compile time and run time. At compile time, a data structure is constructed, that analyzes the execution sequences of a transaction and computes minimal conditions for effect preservation. The transaction code is augmented with instructions that navigate along the data structure and test the computed minimal conditions.

This method produces *minimal effect preserving transactions*, and under certain conditions, provides meaningful improvement over the quadratic overhead of pure run time procedures. For transactions without loops, the run time overhead is linear in the size of the transaction, and for general transactions, the run time overhead depends linearly on the length of the execution sequence and the number of loop repetitions. The method is currently being implemented within a traditional database system.

**Keywords:** rule triggering systems, effect preservation, minimal conditions, consistency, static analysis, transaction processing

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