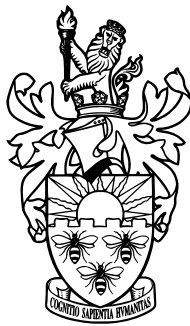


INTERPRETING
TUPLE RELATIONAL CALCULUS
VIA SQL TRANSLATION



A DISSERTATION SUBMITTED TO THE UNIVERSITY OF MANCHESTER
FOR THE DEGREE OF MASTER OF SCIENCE
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Abstract

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The need for efficient storage and manipulation techniques for large amounts of structured information eventually resulted in arguably one of the most important achievements in computer science: databases. The relational model, originally proposed by Codd in [Cod70], has received vast academic and industrial attention.

The Relational Algebra (RA) was proposed as a procedural query language and, even today, it is used to explain the steps in query computations. In contrast, the Tuple Relational Calculus (TRC) was proposed as a declarative query language. It was, as inferable through its semantics, one of the main inspirations behind SQL. Despite this, and perhaps because of its abstract nature, TRC lacks a standard grammar recorded in the literature and has fewer options regarding the practical evaluation of queries.

The motivation behind this thesis was to enable the (regrettably thus far neglected) hands-on study of TRC. An evaluation tool for TRC queries was built for this purpose. It is capable of parsing a TRC query expression, translating it into SQL, executing it against an SQL database and displaying the results. Ultimately, the application aims to help students build TRC queries and verify their correctness, rather than resorting to pen-and-paper calculations.

The tool was built as a web application, with dependencies on a JavaScript generated PEG parser and a JavaScript-compiled version of SQLite 3. While the TRC evaluator was found to be expressively powerful, it could be further extended with additional functionality such as nulls and aggregate functions. In addition, a more human-factors oriented research with the proposed tool could also prove to be insightful.