

A Pattern Calculus for Rule Languages: Expressiveness, Compilation, and Mechanization (Artifact)

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Abstract

This artifact contains the accompanying code for the ECOOP 2015 paper: “A Pattern Calculus for Rule Languages: Expressiveness, Compilation, and Mechanization”. It contains source files for a full mechanization of the three languages presented in the paper: CAMP (Calculus for Aggregating Matching Patterns), NRA (Nested Relational Algebra)

and NNRC (Named Nested Relational Calculus). Translations between all three languages and their attendant proofs of correctness are included. Additionally, a mechanization of a type system for the main languages is provided, along with bidirectional proofs of type preservation and proofs of the time complexity of the various compilers.

1998 ACM Subject Classification I.2.5 Programming Languages and Software: Expert system tools and techniques, D.3.3 Language Constructs and Features: Patterns, H.2.3 Languages: Query Languages

Keywords and phrases Rules, Pattern Matching, Aggregation, Nested Queries, Mechanization

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1 Scope

The artifact is designed as a complete verified implementation of the formalisms in the paper, including proofs for all the main theorems, with the exception of the type inference theorem from Section 7.6. As described in Figure 2 from the introduction of the paper, the original JRules language is also outside the scope of our mechanization.

2 Content

The artifact package includes:

- The complete source for for the mechanization, organized in the following directories:
 - Basic: Basic definitions, lemmas, and utilities shared by all the language developments.
 - Rules: Defines CAMP and the rule language
 - NRA: Defines the Nested Relational Algebra
 - NNRC: Defines the Named Nested Relational Calculus
 - Translation: Translations between the languages, as well as their accompanying correctness and type preservation results.
- HTML documentation corresponding to the source is provided to facilitate inspection of the code, produced through coqdoc. (html directory)



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08:2 A Pattern Calculus for Rule Languages (Artifact)

- A more detailed overview of the contents of the code, along with cross references between the code and the paper that serve as a guide to the artifact (index.html file).
- A Makefile that allows the user to build the proofs by running `coq`. Note that building simply verifies the proofs, and is not otherwise required to understand the development.

3 Getting the artifact

The artifact endorsed by the Artifact Evaluation Committee is available free of charge on the Dagstuhl Research Online Publication Server (DROPS).

4 Tested platforms

The artifact should work on any platform that supports the Coq proof assistant [1] version 8.4pl5 or later, and `gnu make`. It has been tested on Linux (Ubuntu 14.04) and MacOS X.

5 License

EPL-1.0 (<http://www.eclipse.org/legal/epl-v10.html>)

6 MD5 sum of the artifact

24e0a0d6b258565630a5e372039cbf44

7 Size of the artifact

392 KB

References

- 1 Coq reference manual, version 8.4pl41. <http://coq.inria.fr/>.