Proceedings of the Workshop on Declarative Programming with Sets*

Abstract

This report contains papers presented at the *Workshop on Declarative Programming with Sets* held in Paris, France, Sept. 28, 1999, in conjunction with the International Conference *PLI'99 - Principles, Logics, and Implementations of high-level programming languages* (`http://pauillac.inria.fr/pli/`).

The papers presented here cover the following topics: computable set theory and theorem proving, programming languages with sets, query languages and non-well-founded sets, and applications using set-based languages.

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Preface

The use of sets, set operations, and various forms of set-theoretical constructs in programming and specification languages has attracted the interest of a number of researchers in the past few years. Various extensions to incorporate set-based features have been put forward in the field of imperative languages (e.g., SETL), functional languages (e.g., Miranda, SEL), (constraint) logic languages (e.g., LDL, CLPS, {log}, SuRE), as well as in the field of specification languages (e.g., Z). Also, some proposals have appeared in the field of visual languages based on sets (e.g., SPARCL). (See, e.g., the WEB pages on *Programming with Sets* at URL `http://www.cs.nmsu.edu/~complog/sets`).

The new emerging notion of declarative programming can constitute a common denominator for all these proposals that so far has been lacking. Indeed, set constructs and operations are by their own nature highly declarative entities. They provide a natural and very abstract way to describe non-deterministic solutions to complex problems. Dealing with them as constraints further enhances their declarativeness. Suitable set operations and data structures (e.g., intensional sets, partial-order clauses) may help render clear and concise formulations to problems involving set collection and aggregate operations. This paradigm is intended to be particularly well-suited to solve problems from graph theory, program analysis, database query, and problems that involve search in general.

The aim of this one-day workshop was to provide an opportunity for discussing the many different ways in which sets have been dealt with so far, with a view to establish some common basis for the new paradigm of declarative programming with sets.

The papers presented at the workshop cover both theoretical and practical aspects. Two papers present results in the area of computable set theory and set-based theorem proving. Five papers deal with (constraint-logic, functional-logic) programming languages endowed with sets, addressing both semantics, implementation and pragmatic issues of programming with sets. Two papers are concerned with the set-theoretic query language Δ and present results about computational complexity and semantics of the language endowed with non-well-founded sets. Another paper is also concerned with non-well-founded sets and complexity issues. Finally, two papers present applications of set-based constraint languages: to animate B specifications, to solve tree descriptions in computational linguistic problems.