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Editorial

Special issue on library-centric software design (LCSD 2006)

This journal issue is dedicated to the 2006 Workshop on Library-Centric Software Design (LCSD 2006). The articles in this issue are expanded versions of select papers from that workshop. The LCSD workshop is a scientific forum for presenting original research in the design, implementation, and evaluation of software libraries. Other major activities include the identification of open questions specific to library research and the discussion of a strategic plan for establishing library research as a field. The papers presented at LCSD 2006 fell into three broad categories: active libraries, type systems, and complex structures. This journal issue includes articles from each of these categories, which we describe in the following paragraphs.

Active libraries. An active library is a software library that takes an active role in compilation by specializing algorithms, optimizing code, tuning itself for a target machine, or describing itself to other tools (such as profilers and debuggers) (Veldhuizen 1998). This journal issue includes three articles on active libraries. The first is titled ***DESOLA: An Active Linear Algebra Library Using Delayed Evaluation and Runtime Code Generation*** by Francis Russell, Michael Mellor, Paul Kelly, and Olav Beckmann. The DESOLA library performs high-level run-time optimization over compositions of linear algebra operations based on the notion of a task graph. The second article, titled ***Efficient Run-Time Dispatching in Generic Programming with Minimal Code Bloat*** by Lubomir Bourdev and Jaakko Järvi, presents techniques for generating efficient, highly-specialized code, dispatching to the specialized code at run-time, and minimizing the code size of the specialized code. They present the results of applying these techniques to Adobe's Generic Image Library. The third article on active libraries, titled ***An Architecture for Generic Extensions***, is written by Cosmin E. Oancea and Stephen M. Watt. This article investigates how to provide language-neutral interfaces for highly expressive and reusable libraries such as the Standard Template Library.

Type systems. This journal issue includes two articles at the intersection between type systems and software libraries. The first article, titled ***Automating Exception-Safety Classification*** by Gustav Munkby and Sibylle Schupp, presents a static analysis to automatically determine which exception safety guarantees are provided by a software library. There are three such guarantees typically used in modern C++ libraries: the basic, strong, and no-throw guarantees (Abrahams 1998). The data-flow analysis of Munkby and Schupp is able to detect when a software library provides the strong and no-throw guarantees. The second article, titled ***Extending Type Systems in a Library: Type-safe XML-processing in C++*** by Yuriy Solodkyy and Jaakko Järvi, presents techniques that enable a C++ library to extend the subtype relation of C++ without modifying the compiler itself. They apply these techniques to provide library-specific static checks, in particular, checking that XML documents respect a given XML Schema.

Complex structures. The third and final category of articles concerns generic libraries for complex structures. This journal issue includes two articles in this category. The first article, titled ***A Generic Lazy Evaluation Scheme for Exact Geometric Computations*** by Sylvain Pion and Andreas Fabri, describes a generic library for exact geometric computations. Their article introduces techniques for mimicking lazy evaluation in C++, which turns out to be critical for the efficiency of exact geometric computations. The second article, titled ***A Generic Topology Library*** by Rene Heinzl and Philipp Schwaha, presents generic programming abstractions for topological spaces.

I wish to thank the authors for their hard work in expanding and revising their papers and thank the anonymous reviewers for their detailed feedback to the authors. Finally, I would like to thank Jan Bergstra, Bas van Vlijmen, and the editorial staff at Elsevier for their help and patience in the preparation of this special issue.

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