Faculty of Computer Science 2007-2008 Seminar Series

TransLucid, the Cartesian Programming

By

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Since 2003, the doubling of chip transistor density every 24 months, in keeping with Moore's law, has not been reflected in single processor speedup, and so chip manufacturers have been developing various forms of manycore and multicore processors. Because of the complexity of programming for these diverse architectures, recently there has been renewed interest in the development of efficiently implementable declarative languages.

The TransLucid programming language is a simple, low-level language, designed to be sufficiently rich for it to be the target language for translating the common programming paradigms into it, while still being fully declarative. The objects manipulated by TransLucid, called hyperdatons, are arbitrary-dimensional infinite arrays, indexed by multidimensional tuples of arbitrary types.

We present the syntax and operational semantics for the complete TransLucid language, including side-effects, limited control of computation, and context-dependent type declarations and variable definitions. We demonstrate that dataflow, functional and imperative programs can all be naturally translated into TransLucid. We conclude with a description of a demand-driven execution mechanism, supporting multiple-thread execution.

Dr. John Plaice is Associate Professor at the University of New South Wales, in Sydney, Australia. He received his B.Math from the University of Waterloo in 1984 and his Ph.D. from the Institut National Polytechnique de Grenoble in 1988. He wrote the semantics and the first compiler for Lustre, now used for programming avionics software for Airbus, Sukhoi, Eurocopter and Pratt & Whitney. In the Omega project, he developed a number of techniques for multilingual typesetting, now used for the publication of documents by Fortune-500 companies around the world. His research focuses on the development of programming languages for context-aware purposes.

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STUDENTS ARE ENCOURAGED TO ATTEND

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