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Edited by  
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R.R. Lombard
Foreword

This book contains a collection of papers presented at a Research and Development conference of the South African Institute of Computer Scientists and Information Technologists (SAICSIT). The conference was held on 13 & 14 November 1997 at the Riverside Sun, Vanderbijlpark. Most of the organization for the conference was done by the Department of Computer Science and Information Technology of the Vaal Triangle Campus, Potchefstroom University for Christian Higher Education.

The programming committee accepted a wide selection of papers for the conference. The papers range from detailed technical research work to reports of work in progress. The papers originate mainly from Academia, but also describe work done in and for Industry. It is hoped that the papers give a true reflection of the current research scene in Computer Science and Information Technology in South Africa. Since one of the aims of the conference is Research development, the papers were not subjected to a refereeing process.

A number of people spent numerous hours helping with the organization of this conference. In this regard, we wish to thank the members of the Organizing committee, and the Programming committee who had very little time to screen the abstracts and compile the program. A special thanks goes to the secretary of the department, Mrs Helei Jooste, whose very able work was interrupted by the birth of her first child.
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Metamodelling in Automated Software Engineering

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This paper describes a metamodelling system that has been created at the University of Cape Town as part of an integrated software engineering environment called the Persistent Programmers Workshop. The workshop architecture is analogous to that of manual production environments: it is configured as a collection of workbenches each designed for specific tasks, with tools and workitems migrating between workbenches and the workshop shelves as jobs progress. The metamodeller is part of the Design Workbench built at UCT to complement the Programming and Application Workbenches developed at the Universities of Glasgow and Oslo.

The core function of the Design Workbench is to support end-user modelling of real-world systems and to translate these models into an extensible set of procedures and data types (the target system). A problem with many automated design environments is that they offer a very limited choice of data and process models. By adding a meta-layer to our system, we enable software design teams to specify the conceptual models they prefer using when developing computer applications. These models are then fully supported by the Workbench tools: that is, the model building, model querying and code generation facilities are tailored accordingly. This does not only make the Workbench adaptable to a variety of models; it also permits different team members to work on the design of a single system using different models (according to personal preference) and allows developers to view/alter their designs from different perspectives simply by selecting another model.

This paper outlines the Persistent Programmers Workbench and shows how a variety of conceptual models can be represented in a single software engineering repository. The metasystem is illustrated with examples to show how models are defined along with their mapping to this repository. The engineering of the metamodelling system is then presented, and we demonstrate how modern programming language features such as orthogonal persistence (all data have equal rights to persistence and program code is the same for both transient and persistent items) and linguistic reflection (calling the compiler at runtime) were used to cater for any model. We conclude with some observations on the relative strengths and weaknesses of major data models (IFO, SDM, ER, OMT and DAPLEX) and examine the potential of our repository as the basis for designing a universal data modelling language.