

First Overture Workshop – co-located at FM’05

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1 Background

This workshop is a milestone in a very long line of research dating from the development of the Vienna Definition Language (VDL) in IBM’s Vienna Laboratory in the 1970s. Originally targeted at language definitions and compiler development, VDL, and its successor the Vienna Development Method (VDM), gradually found a wider range of applications. Seminal texts, notably those by Dines Bjørner and Cliff Jones [1–3], presented, in a formal context, many notions which are mainstream now, such as pre- and postcondition specification, data and operation refinement. VDM’s specification language, VDM-SL, achieved ISO standardization of both its syntax and formal (denotational) semantics in 1996.

Although the VDM-SL work was successful in a range of applications, it had already become apparent that the link between plain formal modeling and object-oriented design could be bridged.

Nico Plat became involved in producing the extended object-oriented version of VDM, called VDM++, initially developed through the European Commission’s Afrodite project and then in a wide range of commercial and research projects and in the development of tool support produced by IFAD [4].

At the end of 2001 Peter Gorm Larsen left IFAD after having spent more than a decade in the development and marketing of the VDMTools product suite. IFAD reduced its VDMTools investment and, and as a consequence the active VDM community declined substantially. After a bankruptcy of IFAD in 2004, the intellectual property rights for VDMTools were acquired by one of its most prominent users, CSK Corporation in Japan.

In parallel to that a group of VDM(++) enthusiasts completed a new book on VDM++ and its relationship to UML and Java [5]. Recognizing the need for a forum in which to advance VDM technology, and in order to encourage a renewal of the VDM community, the same group started the Overture initiative. This workshop is, in a sense, the first gathering of this renewed community.

2 History and aim of Overture

In the period 1992-1995 the object-oriented version of the formal specification language VDM-SL, called VDM++, was developed though the European Commission’s Afrodite project. VDM++ was used in a wide range of commercial and research projects. This also led to the development of a commercially available,

industry strength tool (VDMTools) by the Danish company IFAD. This tool set is now property of CSK, Japan. Recently, in January 2005, a book appeared (*Validated Designs for Object-oriented Systems*, Fitzgerald et al., [5]) that illustrates the use of VDM++ technology, including a number of industrial case studies.

At the beginning of 2004 the authors of this book began to realize that new insights in tool support for formal specification languages, the use of new technologies such as XML, and the current trend in open source software were good incentives for starting the development of a second tool set supporting the use of VDM++. This open source project has been named Overture.

Currently a basic tool set exists (VDM++ to XML parser, as an Eclipse plug-in), and students from Denmark (Technical University of Denmark) and Portugal (University of Minho) are already working on improvements and further developments.

The mission of the project is twofold: to provide an industrial-strength tool to allow the use of precise abstract models in software development, and to foster an environment that allows researchers and other interested parties to experiment with modifications and extensions to the tool.

3 Content of the workshop

The papers at this workshop reflect the character of the Overture initiative: that of researching and extending the capabilities of a VDM-based modeling language, and making this practically applicable with appropriate tools. Developments on the language front drive the tools forward, *and vice versa*.

Concrete work on the Overture tools was initiated by Pieter van der Spek, who developed a kernel with strong emphasis on the use of XML. A second kernel with the flexibility and extensibility required for service in an open source framework has been developed by Jacob Porsborg Nielsen and Jens Kielsgaard Hansen of the Technical University of Denmark. The kernel supports VDM++ development on top of the Eclipse platform. The first paper presented at this workshop addresses their work.

After this presentation Shin Sahara (JFITS, Japan) will briefly update the attendees on the state of VDMTools.

The second presentation, by Joost Visser (Minho University, Portugal), concerns the development of an “industrial strength grammar” for the VDM specification language, starting from the ISO VDM-SL standard. The iterative methodology employed includes grammar metrication, unit testing, and test coverage analysis. The result is an industrial strength grammar in the sense that it is well-tested, can be used for fast parsing of high volumes of VDM specifications, and allows automatic generation of support for syntax tree representation, traversal, and interchange. We hope that the workshop will provide for a constructive discussion on how best to exploit this work in Overture.

Marcel Verhoef (Chess IT, The Netherlands) will focus on concurrency and real-time in an abstract setting using VDM++. There has been a long tradition

of research in this area, proposing language extensions to support specification of real-time systems. However, the practical applicability of this research has not been properly assessed. The purpose of this presentation is to assess these language extensions based on the results of an industrial case study. Hopefully this can lead to discussions at the workshop about extensions to be made for the Overture framework and the features needed in order to be able to make such extensions.

The fourth presentation will again be given by Joost Visser and this time the focus will be on Camila, the legacy VDM tool support constructed at Minho University. This development, which predates VDMTools, includes many interesting features that are worth considering for inclusion in the Overture tool set.

The fifth and sixth presentation address testing. Bernhard Aichernig (UNU / IIST, Macau) will present recent work on specification-based test case generation via model mutation. The idea is not to cover a specification structurally, but to cover a predefined set of possible faults. A prototype tool has been made that generates such test cases, currently for OCL specifications, that could be easily adapted to VDM++ and could become part of Overture.

In the final presentation, Alexander Petrenko (ISPRAS, Russia) will then provide a comparison of VDM++ and specification extension of programming languages for modeling and test generation (JML, Spec#, UniTesK). The different aspects of VDM++ used will be considered in the full cycle of software development. Pros and cons will be discussed from different points of view: architects, designers, developers, testers, managers, QA staff, etc. Hopefully the workshop can also be used to determine to what extend this could be used in the Overture framework and how it complement the testing approach suggested by Bernhard Aichernig.

The closing session will be a brainstorm session during which the workshop participants will discuss where we are today, where we want to go, and finally how we are going to get there. Ideally this concludes with a tentative plan for the future evolution of the Overture framework such that it will become clear how Overture will develop in the future.

Welcome to this Overture workshop. We hope that it will be exciting and that all the participants will feel welcome to take an active part in the discussions. Personally we both very much look forward to this workshop. As the Americans say, “Enjoy!”

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4 Acknowledgments

First and foremost we would like to thank the Centre for Software Reliability, the University of Newcastle upon Tyne and the organizers of FM'05 (notably Claire Smith) for hosting and organizing the workshop. Furthermore we thank the contributors who have prepared material for this workshop, our co-authors of the new VDM++ book, and all the contributors to the Overture initiative (present and past).

References

1. Jones, C.B.: Software Development: A Rigorous Approach. Prentice-Hall International, Englewood Cliffs, New Jersey (1980)
2. Bjorner, D., Jones, C.B.: Formal Specification and Software Development. International Series in Computer Science. Prentice-Hall, London (1982)
3. Jones, C.B.: Systematic Software Development Using VDM. Second edn. International Series in Computer Science. Prentice Hall, Englewood Cliffs, N.J. (1990)
4. IFAD: VdmTools – The IFAD VDM++ Language. Institute for Applied Computer Science, Forskenparken 10, DK-5230 Odense M (2000)
5. Fitzgerald, J., Larsen, P.G., Mukherjee, P., Plat, N., Verhoef, M.: Validated Designs for Object-oriented Systems. Springer, New York (2005)