

# Lecture Notes in Computer Science

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H. Langmaack (Eds.)

## VDM '90 VDM and Z – Formal Methods in Software Development

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Proceedings



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# Vdm 90 Vdm Z Formal Methods In Softwar

**Juan Carlos Bicarregui**



## **Vdm 90 Vdm Z Formal Methods In Softwar:**

*VDM '90. VDM and Z - Formal Methods in Software Development* Dines Bjorner, C.A.R. Hoare, Hans Langmaack, 2014-03-12 The present volume is the third in a series of VDM Symposia Proceedings VDM the Vienna Development Method is a formal method for software engineering Z refers to Zermelo a mathematician whose name is associated with set theory Many computing science programming and software engineering proceedings are published regularly The ones by VDM Europe have the distinguished mark that they are concerned with bringing real theory to apply to real programming In Europe there is very much interest in methodology semantics and techniques that is in understanding how we build and what it is that we are building The papers of these proceedings basically fall into four major groups Applications Methodology Formalisations and Foundations The Methodology group has been further subdivided into five areas Specification Methodology Design Methodology Modularity Object Orientedness and Processes Concurrency and Distributed Systems

*VDM '90 : VDM and Z*, 1990 **VDM '90** Dines Bjørner, Charles Antony Richard Hoare, Hans Langmaack, 1990 VDM stands for Vienna Development Method while Z refers to Zermelo a mathematician whose name is associated with set theory VDM Europe formed around 1985 by the Commission of the European Communities is a group of industrial and academic software engineers programmers and scientists interested in model theoretic formal software development methods The preface compares and contrasts features of VDM and Z Annotation copyrighted by Book News Inc Portland OR

**Software Engineer's Reference Book** John A McDermid, 2013-10-22 Software Engineer's Reference Book provides the fundamental principles and general approaches contemporary information and applications for developing the software of computer systems The book is comprised of three main parts an epilogue and a comprehensive index The first part covers the theory of computer science and relevant mathematics Topics under this section include logic set theory Turing machines theory of computation and computational complexity Part II is a discussion of software development methods techniques and technology primarily based around a conventional view of the software life cycle Topics discussed include methods such as CORE SSADM and SREM and formal methods including VDM and Z Attention is also given to other technical activities in the life cycle including testing and prototyping The final part describes the techniques and standards which are relevant in producing particular classes of application The text will be of great use to software engineers software project managers and students of computer science

*VDM '90* Dines Bjørner, Charles Antony Richard Hoare, H. Langmaack, 1990 **ZUM '98: The Z Formal Specification Notation** Jonathan P. Bowen, Andreas Fett, Michael G. Hinchey, 1998-09-16 1 In a number of recent presentations most notably at FME 96 one of the foremost scientists in the field of formal methods C A R Hoare has highlighted the fact that formal methods are not the only technique for producing reliable software This seems to have caused some controversy not least amongst formal methods practitioners How can one of the founding fathers of formal methods seemingly denounce the field of research after over a quarter of a century of support This

is a question that has been posed recently by some formal methods skeptics. However, Prof Hoare has not abandoned formal methods. He is reiterating, albeit more radically, his 1987 view that more than one tool and notation will be required in the practical industrial development of large scale complex computer systems and not all of these tools and notations will be or even need be formal in nature. Formal methods are not a solution but rather one of a selection of techniques that have proven to be useful in the development of reliable complex systems and to result in hardware and software systems that can be produced on time and within a budget while satisfying the stated requirements. After almost three decades the time has come to view formal methods in the context of overall industrial scale system development and their relationship to other techniques and methods. We should no longer consider the issue of whether we are pro formal or anti formal but rather the degree of formality if any that we need to support in system development. This is a goal of ZUM 98, the 11th International Conference of Z Users held for the first time within continental Europe in the city of Berlin, Germany.

**Z User Workshop, London 1992** J.P. Bowen, J.E. Nicholls, 2013-03-09. The Z notation has been developed at the Programming Research Group at the Oxford University Computing Laboratory and elsewhere for over a decade. It is now used by industry as part of the software and hardware development process in both Europe and the USA. It is currently undergoing BSI standardisation in the UK and has been proposed for ISO standardisation internationally. In recent years researchers have begun to focus increasingly on the development of techniques and tools to encourage the wider application of Z and other formal methods and notations. This volume contains papers from the Seventh Annual Z User Meeting held in London in December 1992. In contrast to previous years the meeting concentrated specifically on industrial applications of Z and a high proportion of the participants came from an industrial background. The theme is well represented by the four invited papers. Three of these discuss ways in which formal methods are being introduced and the fourth presents an international survey of industrial applications. It also provides a reminder of the improvements which are needed to make these methods an accepted part of software development. In addition the volume contains several submitted papers on the industrial use of Z, two of which discuss the key area of safety critical applications. There are also a number of papers related to the recently completed ZIP project. The papers cover all the main areas of the project including methods, tools and the development of a Z Standard, the first publicly available version of which was made available at the meeting. Finally the volume contains a select Z bibliography and section on how to access information on Z through comp specification z, the international computer based USENET newsgroup Z.

User Workshop London 1992 provides an important overview of current research into industrial applications of Z and will provide invaluable reading for researchers, postgraduate students and also potential industrial users of Z.

VDM '90  
VDM-Europe. International Symposium, 1990

*Software Engineer's Pocket Book* Michael Tooley, 2013-10-22. *Software Engineer's Pocket Book* provides a concise discussion on various aspects of software engineering. The book is comprised of six chapters that tackle various areas of concerns in software engineering. Chapter 1 discusses software development and

Chapter 2 covers programming languages Chapter 3 deals with operating systems The book also tackles discrete mathematics and numerical computation Data structures and algorithms are also explained The text will be of great use to individuals involved in the specification design development implementation testing maintenance and quality assurance of software

*Formal Methods for Distributed Processing* Howard Bowman, John Derrick, 2001-10-22 Originally published in 2002 this book presents techniques in the application of formal methods to object based distributed systems A major theme of the book is how to formally handle the requirements arising from OO distributed systems such as dynamic reconfiguration encapsulation subtyping inheritance and real time aspects These may be supported either by enhancing existing notations such as UML LOTOS SDL and Z or by defining fresh notations such as Actors Pi calculus and Ambients The major specification notations and modelling techniques are introduced and compared by leading researchers The book also includes a description of approaches to the specification of non functional requirements and a discussion of security issues Researchers and practitioners in software design object oriented computing distributed systems and telecommunications systems will gain an appreciation of the relationships between the major areas of concerns and learn how the use of object oriented based formal methods provides workable solutions

**The Way of Z** Jonathan Jacky, 1997 A self contained tutorial on Z for working programmers discussing practical ways to apply formal methods in real projects first published in 1997

**Algebraic Methodology and Software Technology**, 1997      **Formal Methods and Software Engineering**, 2003

**FME '97 Industrial Applications and Strengthened Foundations of Formal Methods** John Fitzgerald, Cliff B. Jones, Peter Lucas, 1997-09-03 This book constitutes the refereed proceedings of FME 97 the 4th International Symposium of Formal Methods Europe devoted to Industrial Applications and Strengthened Foundations of Formal Methods held in Graz Austria in September 1997 The 35 revised full papers presented in the volume were selected from a total of 94 submissions Formal methods and mathematically based techniques are increasingly recognized as a viable technology for the development and engineering of computing systems The majority of the papers in this volume describe industrial applications extensions to existing techniques or case studies papers on theoretical aspects show clear potential applicability

Z User Workshop, London 1992 Jonathan Peter Bowen, John E. Nicholls, 1993 The Z notation has been developed at the Programming Research Group at the Oxford University Computing Laboratory and elsewhere for over a decade It is now used by industry as part of the software and hardware development process in both Europe and the USA It is currently undergoing BSI standardisation in the UK and has been proposed for ISO standardisation internationally In recent years researchers have begun to focus increasingly on the development of techniques and tools to encourage the wider application of Z and other formal methods and notations This volume contains papers from the Seventh Annual Z User Meeting held in London in December 1992 In contrast to previous years the meeting concentrated specifically on industrial applications of Z and a high proportion of the participants came from an industrial background The theme is well represented by the four invited papers

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*Proof in VDM* Juan Carlos Bicarregui, 1998 This volume provides an invaluable companion to *Proof in VDM A Practitioner's Guide*. Using the proof theory presented in that volume it examines a variety of realistic case studies which illustrate different aspects of the use of proof in formal development. Rather than concentrating on the construction of formal specifications like most work in this area it devotes two chapters to validation using proof describing how proofs in VDM can be constructed via instantiations of the PVS and Isabelle theorem provers. *Proof in VDM Case Studies* will provide invaluable reference material for practitioners of formal methods who need to construct proofs, students requiring a detailed introduction to the practicalities of proof and researchers interested in the role of theorem proving in formal development and relevant tool support.

*Z User Workshop, Oxford 1990* J.E. Nicholls, 1991-07-31 The approach described in JonSl, JonS3a, JonS3b set out to extend operation decomposition methods for sequential programs such as are used in VDM. Jon90 to cover concurrent shared variable systems. The essential step in JonSl was to recognise that interference had to be specified. This is necessary in order to achieve a notion of compositionality. Contrast Ow75. Rather than the many erudite definitions of compositionality e.g. ZwiSS the view taken here is that when a development task is decomposed into sub tasks these must be simpler than the original task. This is easy to achieve for sequential programs decomposing a specified operation S into S1, S2 the specifications of the Sj should neither include unnecessary information from each other nor from the context i.e. S. An interesting discussion of the Quest for Compositionality in the context of concurrency is contained in dRS5, dRS6. The rely/guarantee idea provided an existence proof that specifications and developments could be made powerful enough to cope with some forms of interference. The work initially attracted little attention but 2, 3 there have recently been some critiques and attempts to extend the work. Most notably Ketil St len's thesis St 90 addresses the main shortcomings of JonSl, the fact that no attempt had been made to handle synchronization has been remedied by adding a wait condition and other limitations of expressiveness have been shown to succumb to the judicious use of auxiliary variables.

*Introductory Logic and Formal Methods* David Heath, Derek Allum, Lynne Dunckley, 1994 **FM ... Formal Methods**

,1999    *TAPSOFT* ,1997

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