

Jonathan P. Bowen   Andreas Fett  
Michael G. Hinchey (Eds.)

# ZUM '98: The Z Formal Specification Notation

11th International Conference of Z Users  
Berlin, Germany, September 24-26, 1998  
Proceedings



Springer

# Table of Contents

## Industrial Issues

Industrial Requirements for the Efficient Development of Reliable Embedded Systems .....	1
<i>K. Grimm (Invited Speaker)</i>	

## Concurrency

How to Combine Z with a Process Algebra .....	5
<i>C. Fischer</i>	
The Specification and Refinement of an Environmental Model .....	24
<i>W.J. (Bill) Stoddart</i>	
Formal Derivation of Finite State Machines for Class Testing .....	42
<i>L. Murray, D. Carrington, I. MacColl, J. McDonald and P. Strooper</i>	

## Tools

Using B to Specify, Verify and Design Hardware Circuits .....	60
<i>I.H. Sørensen (Invited Speaker)</i>	
Z on the Web Using Java .....	66
<i>J.P. Bowen and D. Chippington</i>	
Visualizing Z Notation in HTML Documents .....	81
<i>P. Ciancarini, C. Mascolo and F. Vitali</i>	

## Z and HOL

On the Semantic Relation of Z and HOL .....	96
<i>T. Santen</i>	
HOL-Z in the UniForM-Workbench – A Case Study in Tool Integration for Z ....	116
<i>C. Lüth, E.W. Karlsen, Kolyang, S. Westmeier and B. Wolff</i>	

## Safety-Critical and Real-Time Systems

Designing a Requirements Specification Language for Reactive Systems .....	135
<i>N.G. Leveson (Invited Speaker)</i>	
Analyzing a Real-Time Program with Z .....	136
<i>J. Jacky</i>	

## Semantic Theory

Recursive Definitions in Z .....	154
<i>R.D. Arthan</i>	
A Logic for the Schema Calculus .....	172
<i>M.C. Henson and S. Reeves</i>	

## Theory and Standards

Combining Specification Techniques for Processes, Data and Time .....	192
<i>E.-R. Olderog (Invited Speaker)</i>	
Innovations in the Notation of Standard Z .....	193
<i>I. Toyn</i>	

## Reasoning and Consistency Issues

Comparing Extended Z with a Heterogeneous Notation for Reasoning about Time and Space .....	214
<i>R.F. Paige</i>	
Inconsistency and Undefinedness in Z – A Practical Guide .....	233
<i>S.H. Valentine</i>	

## Refinement

Compositional Specification of Controllers for Batch Process Operations .....	250
<i>K. Lano, P. Kan and A. Sanchez</i>	
Testing Refinements by Refining Tests .....	265
<i>J. Derrick and E. Boiten</i>	
More Powerful Z Data Refinement: Pushing the State of the Art in Industrial Refinement .....	284
<i>S. Stepney, D. Cooper and J.C.P. Woodcock</i>	

## Object Orientation

Network Topology and a Case Study in TCOZ .....	308
<i>B. Mahony and J.S. Dong</i>	
Object-Oriented Specification of Hybrid Systems Using UML <sup>h</sup> and ZimOO .....	328
<i>V. Friesen, A. Nordwig and M. Weber</i>	
Translating the OMT Dynamic Model into Object-Z .....	347
<i>S. Dupuy, Y. Ledru and M. Chabre-Peccoud</i>	

**Appendices**

Select Z Bibliography .....	367
<i>J.P. Bowen</i>	
Comp.specification.z and Z FORUM Frequently Asked Questions .....	407
<i>J.P. Bowen</i>	
<b>Author Index</b> .....	417