

Lecture Notes in Computer Science

Edited by G. Goos, J. Hartmanis, and J. van Leeuwen

1618

Springer

Berlin

Heidelberg

New York

Barcelona

Hong Kong

London

Milan

Paris

Singapore

Tokyo

Jean Bézivin Pierre-Alain Muller (Eds.)

The Unified Modeling Language

«UML»'98: Beyond the Notation

First International Workshop
Mulhouse, France, June 3-4, 1998
Selected Papers



Springer

Series Editors

Gerhard Goos, Karlsruhe University, Germany
Juris Hartmanis, Cornell University, NY, USA
Jan van Leeuwen, Utrecht University, The Netherlands

Volume Editors

Jean Bézivin
Université de Nantes, Faculté des Sciences et Techniques
2, Rue de la Houssinière, B.P. 92208, F-44322 Nantes Cedex 3, France
E-mail: jean.bezivin@sciences.univ-nantes.fr

Pierre-Alain Muller
Objexion Software
5, Rue Gutenberg, F-68800 Vieux-Thann, France
E-mail: pa.muller@essaim.univ-mulhouse.fr

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

The unified modeling language : first international workshop ; selected papers /
UML '98: Beyond the Notation, Mulhouse, France, June 3 - 4, 1998. Jean Bézivin
; Pierre-Alain Muller (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ;
Hong Kong ; London ; Milan ; Paris ; Singapore ; Tokyo : Springer, 1999
(Lecture notes in computer science ; Vol. 1618)
ISBN 3-540-66252-9

CR Subject Classification (1998): D.2, D.3

ISSN 0302-9743

ISBN 3-540-66252-9 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

© Springer-Verlag Berlin Heidelberg 1999
Printed in Germany

Typesetting: Camera-ready by author
SPIN: 10705238 06/3142 - 5 4 3 2 1 0 Printed on acid-free paper

Preface

This volume contains mainly the revised versions of papers presented at the workshop <<UML>>'98, "Beyond the Notation", that took place in Mulhouse, France on June 3-4, 1998. We thank all those that have made this possible, and particularly all the people in Mulhouse that worked hard to make this meeting a success, with such a short delay between the announcement and the realization. We are specially grateful to Nathalie Gaertner, who put in a tremendous amount of effort in the initial preparation of the workshop.

We were pleasantly surprised of the quality of the submitted material and of the level of the technical exchanges at the Mulhouse meeting. More than one hundred attendees, from about twenty different countries, representing the main actors in the UML research and development scene, gathered in Mulhouse for two full study days.

We would like to express our deepest appreciation to the authors of submitted papers, the editorial committee for this volume, the program committee for the initial workshop, the external referees, and many others who contributed towards the final contents of this volume.

April 1999

Jean Bézivin
Pierre-Alain Muller

Editorial Committee for This Volume

F. Alizon, France
C. Atkinson, Germany
J. Bézivin, France
G. Bochmann, Canada
G. Booch, USA
M. Bouzeghoub, France
D. Coleman, USA
S. Cook, UK
L. Delcambre, USA
P. Desfray, France
D. d'Souza, USA
W. Emmerich, UK
G. Engels, Germany
J. Ernst, USA
R. France, USA
U. Frank, Germany
M. Gogolla, Germany
B. Henderson-Sellers, Australia
M. Hitz, Austria
P. Hruby, Denmark
S. Iyengar, USA
I. Jacobson, USA
J.M. Jézéquel, France

S. Kent, UK
N. Kettani, France
H. Kilov, USA
K. Kobryn, USA
P. Kruchten, Canada
K. Lano, UK
P. Laublet, France
T. Mens, Belgium
P.A. Muller, France
J. Odell, USA
G. Overgaard, Sweden
B. Paech, Germany
B. Pernici, Italy
W. Pidcock, USA
T. Reenskaug, Norway
B. Rumpe, Germany
B. Selic, Canada
J. Warmer, Netherlands
T. Wasserman, USA
R. Wirfs-Brock, USA
M. Schader, Germany
R. Soley, USA

Additional Reviewers

M. Bousse, France
B. Caillaud, France
A. Cockburn, USA
J.P. Girardin, France
L. Helouet, France

A. Le Guennec, France
H. Milli, Canada
P. Perrin, France
H. Wai Ming, France

Table of Contents

UML: The Birth and Rise of a Standard Notation.....	1
<i>J. Bézivin, P.A. Muller</i>	
Developing with UML - Some Pitfalls and Workarounds	9
<i>M. Hitz, G. Kappel</i>	
Supporting and Applying the UML Conceptual Framework.....	21
<i>C. Atkinson</i>	
Modeling: Is It Turning Informal into Formal?.....	37
<i>B. Morand</i>	
Best of Both Worlds – A Mapping from EXPRESS-G to UML.....	49
<i>F. Arnold, G. Podehl</i>	
Porting ROSES to UML – An Experience Report	64
<i>A. Olivé, M.R. Sancho</i>	
Making UML Models Interoperable with UXF.....	78
<i>J. Suzuki, Y. Yamamoto</i>	
Transformation Rules for UML Class Diagrams.....	92
<i>M. Gogolla & M. Richters</i>	
Semantics and Transformations for UML Models	107
<i>K. Lano, J. Bicarregui</i>	
Automation of Design Pattern: Concepts, Tools and Practices.....	120
<i>P. Desfray</i>	
Automating the Synthesis of UML StateChart Diagrams from Multiple Collaboration Diagrams	132
<i>I. Khriess, M. Elkoutbi, R. K. Keller</i>	
Informal Formality? The Object Constraint Language and Its Application in the UML Metamodel.....	148
<i>A. Kleppe, J. Warner, S. Cook</i>	
Reflections on the Object Constraint Language	162
<i>A. Hamie, F. Civello, J. Howse, S. Kent, R. Mitchell</i>	

On Using UML Class Diagrams for Object-Oriented Database Design Specification of Integrity Constraints	173
<i>Y. Ou</i>	
Literate Modelling – Capturing Business Knowledge with the UML	189
<i>J. Arlow, W. Emmerich, J. Quinn</i>	
Applying UML to Design an Inter-domain Service Management Application.....	200
<i>M. Mancona Kandé, S. Mazaher, O. Prnjat, L. Sacks, M. Wittig</i>	
BOOSTER*Process A Software Development Process Model Integrating Business Object Technology and UML	215
<i>A. Korthaus, S. Kuhlins</i>	
Hierarchical Context Diagram with UML: An Experience Report on Satellite Ground System Analysis.....	227
<i>E. Bourdeau, P. Lugagne, P. Roques</i>	
Extension of UML Sequence Diagrams for Real-Time Systems.....	240
<i>J. Seeman, J. Wolff v. Gudenberg</i>	
UML and User Interface Modeling.....	253
<i>S. Kovacevik</i>	
On the Role of Activity Diagrams in UML – A User Task Centered Development Process for UML	267
<i>B. Paech</i>	
Structuring UML Design Deliverables	278
<i>P. Hruby</i>	
Considerations of and Suggestions for a UML-Specific Process Model.....	294
<i>K. Kivisto</i>	
An Action Language for UML: Proposal for a Precise Execution Semantics.....	307
<i>S.J. Mellor, S.R. Tockey, R. Arthaud, P. Leblanc</i>	
Real-Time Modeling with UML: The ACCORD Approach.....	319
<i>A. Lanusse, S. Gérard, F. Terrier</i>	
The UML as a Formal Modeling Notation	336
<i>A. Evans, R. France, K. Lano, B. Rumpe</i>	
OML: Proposals to Enhance UML	349
<i>B. Henderson-Sellers</i>	

Validating Distributed Software Modeled with the Unified Modeling Language	365
<i>J.M. Jézéquel, A. Le Guennec, F. Pennanearc'h</i>	
Supporting Disciplined Reuse and Evolution of UML Models	378
<i>T. Mens, C. Lucas, P. Steyaert</i>	
Applying UML Extensions to Facilitate Software Reuse	393
<i>N.G. Lester, F.G. Wilkie, D.W. Bustard</i>	
A Formal Approach to Use Cases and Their Relationships	406
<i>G. Övergaard, K. Palmkvis</i>	
A Practical Framework for Applying UML	419
<i>P. Allen</i>	
Extending Aggregation Constructs in UML	434
<i>M. Saksena, M.M. Larrondo-Petrie, R.B. France, M.P.Evett</i>	
Author Index	443