

Fourth International
Conference on the
Unified Modeling
Language

<<**UML**>> 2001

"Modeling Languages, Concepts and Tools"



October 1 - 5, 2001,
Toronto, Ontario, Canada

Programme

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Conference Chair : Jaelson Castro, Brazil

Programme Chair : Martin Gogolla, Germany

Tutorial/Workshop Chair: Heinrich Hussmann, Germany

Publicity Chairs : Jean-Michel Bruel, France
Robert France, USA

Local Chair : Manuel Kolp, Canada

Programme Organisation : Ralf Kollmann, Germany
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Welcome to <<UML>>2001

<<UML>> 2001 is the fourth conference in the <<UML>> series. The conference is the premier venue for exchange of innovative technical ideas and experiences relating to the Unified Modeling Language (UML). In 2001, the conference moves to Toronto, one of the most multicultural city in the world. The main conference programme runs from Wednesday 3rd October through Friday 5th October. Prior to the main programme, there are two days of tutorials and workshops.

Programme Highlights

The keynote speakers <<UML>>2001 welcomes three outstanding plenary speakers:

- ✓ Dr. James Rumbaugh, Rational Software Corporation, USA
- ✓ Prof. Werner Damm, University of Oldenburg, Germany
- ✓ Prof. John, Mylopoulos, University of Toronto, Canada

The technical papers includes 32 full papers, selected from a total of 102 submissions, reporting on a full range of topics, including Metamodeling, Activity Diagrams, OCL, Architecture and Patterns, Analysis and Testing, Performance and Databases, Graph Transformation, Associations and Ontology, Statecharts.

The panel sessions aim to provide stimulating discussion of interesting issues related to the research and practice of UML:

- ✓ Formal Semantics for UML: Why? How? For Whom?
- ✓ UML Profiles
- ✓ UML 2.0
- ✓ Visual Modeling beyond UML

The workshops are on Monday and Tuesday. They provide a forum for groups of researchers and practitioners to meet for one day and to exchange opinions, advance ideas, and share preliminary results on focused issues in an atmosphere that fosters interaction and problem solving:

Welcome to <<UML>>2001

- ✓ Practical UML-Based Rigorous Development Methods - Countering or Integrating the extremists?
- ✓ Concurrency Issues in UML
- ✓ The Constraint Language for UML 2.0

The tutorials are also on Monday and Tuesday. The full-day or half -day tutorials provide the opportunity to gain new insights, knowledge, and skills:

- ✓ Describing Software Architecture with the UML
- ✓ A Revolution in UML Tool Use? Tool Adaptation, Extension and Integration using XMI
- ✓ From Requirements to UML Models with Use Case Maps
- ✓ Realising MDA: a Precise Meta-Modelling Approach
- ✓ Executable UML (xUML): An Interactive Tutorial

Receptions <<UML>>2001 features two causal receptions and a banquet with great food to give all an opportunity to meet and mingle with old and new friends.

We hope you enjoy the week!!

Cris Kobryn
General Chair

Jaelson Castro
Conference Chair

Martin Gogolla
Programme Chair

Heinrich Hussmann
Tutorial & Workshop Chair

Jean-Michel Bruel & Robert France
Publicity Chairs

Manuel Kolp
Local Chair

Monday 1 October

Monday at a Glance			
09:00-10:30	@ Conference F Workshop W3: Practical UML- Based Rigorous "Development Methods - Countering or Integrating the eXtremists?"	@ Windsor W + E Tutorial T1: Bran Selic & Wojtek Kozaczynski "Describing Software Architecture with the UML"	
10:30-11:00	Nutrition Break @ Foyer		
10:30-12:30	W3 Continued	T1 Continued	
12:30-14:00	Lunch @ Conference B+C (for all Monday tutorial and workshop attendees)		
14:00-15:30	W3 Continued	T1 Continued	@ Conference D + E Tutorial T3: Perdita Stevens "A Revolution in UML Tool Use? Tool Adaptation, Extension and Integration using XMI"
15:30-16:00	Nutrition Break @ Foyer		
16:00-17:30	W3 Continued	T1 Continued	T3 Continued
18:00-19:30	Tutorial and Workshop Welcome Reception @ Long Bar (Sheraton Hotel)		

Monday 1 October

Workshops and Tutorials

09:00 – 10:30	Workshop W3: Practical UML-Based Rigorous "Development Methods - Countering or Integrating the eXtremists?" Tutorial T1: Bran Selic & Wojtek Kozaczynski "Describing Software Architecture with the UML"	@ Conference F @ Windsor W + E
10:30 – 11:00	Nutrition break @ Essex Foyer	
11:00 – 12:30	Workshop W3 Continued Tutorial T1 Continued	@ Conference F @ Windsor W + E
12:30 – 14:00	Lunch @ Conference B + C	
14:00 – 15:30	Workshop W3 Continued Tutorial T1 Continued Tutorial T3: Perdita Stevens "A Revolution in UML Tool Use? Tool Adaptation, Extension and Integration using XMI"	@ Conference F @ Windsor W + E @ Conference D + E
15:30 – 16:00	Nutrition break @ Essex Foyer	
16:00 – 17:30	Workshop W3 Continued Tutorial T1 Continued Tutorial T3 Continued	@ Conference F @ Windsor W + E @ Conference D + E
18:00 – 19:30	Tutorial and Workshop Welcome Reception @Long Bar (Sheraton Hotel)	

Tuesday 2 October

Tuesday at a Glance				
9:00-10:30	@ Essex Workshop W4: Concurrency Issues in UML	@ Conference F Workshop W5: The Constraint Language for UML 2.0	@ Windsor West Tutorial T4: Daniel Amyot & Gunter Mussbacher "From Requirements to UML Models with Use Case Maps"	@ Windsor East Tutorial T6: Tony Clark & Andy Evans & Stuart Kent "Realising MDA: a Precise Meta-Modelling Approach"
10:30-11:00	Nutrition Break @ Foyer			
11:00-12:30	W4 Continued	W5 Continued	T4 Continued	T6 Continued
12:30-14:00	Lunch @ Conference D + E (for all Tuesday tutorial and workshop attendees)			
14:00-15:30	W4 Continued	W5 Continued	@ Windsor West Tutorial T9: Chris Raistrick & Ian Wilkie "Executable UML (xUML): An Interactive Tutorial"	
15:30-16:00	Nutrition Break @ Foyer			
16:00-17:30	W4 Continued	W5 Continued	T9 Continued	

Tuesday 2 October

Workshops and Tutorials

09:00 – 10:30	Workshop W4: Concurrency Issues in UML	@ Essex
	Workshop W5: The Constraint Language for UML 2.0	@ Conference F
	Tutorial T4: Daniel Amyot & Gunter Mussbacher "From Requirements to UML Models with Use Case Maps"	@ Windsor West
	Tutorial T6: Tony Clark & Andy Evans & Stuart Kent "Realising MDA: a Precise Meta-Modelling Approach"	@ Windsor East
10:30 – 11:00	Nutrition break @ Essex Foyer	
11:00 – 12:30	Workshop W4 Continued Workshop W5 Continued Tutorial T4 Continued Tutorial T6 Continued	@ Essex @ Conference F @ Windsor West @ Windsor East
12:30 – 14:00	Lunch @ Conference D + E	
14:00 – 15:30	Workshop W4 Continued Workshop W5 Continued Tutorial T9: Chris Raistrick & Ian Wilkie "Executable UML (xUML): An Interactive Tutorial"	@ Essex @ Conference F @ Windsor West
15:30 – 16:00	Nutrition break @ Essex Foyer	
16:00 – 17:30	Workshop W4 Continued Workshop W5 Continued Tutorial T9 Continued	@ Essex @ Conference F @ Windsor West

Thursday at a Glance		
09:00-10:00	@ Essex Keynote address: Prof. Werner Damm "Understanding UML - Pains and Rewards"	
10:00-10:30	Nutrition Break @Essex Foyer	
10:30-12:00	@ Essex Papers P7: Graph Transformations	@ Windsor Papers P8: Real Time and Embedded Systems
12:00-13:00	Lunch @ Long Bar	
13:00-14:00	@ Essex Panel: "UML Profiles "	
14:00-15:30	@ Essex Papers P9: Associations and Ontology	@ Windsor Papers P10: Statecharts
15:30-16:00	Nutrition Break @Essex Foyer	
16:00-17:00	@ Essex Panel: "UML 2.0 "	
19:30-20:30	Conference Banquet @ CN Tower	

09:00 – 10:00	Invited Talk Chair: Cris Kobryn, USA	@ Essex
	Understanding UML - Pains and Rewards Prof Werner Damm, University of Oldenburg	
10:00 – 10:30	Nutrition break @ Essex Foyer	
10:30 – 12:00	Paper Session 7 – Graph Transformations	@ Essex
	<i>A Formal Semantics of UML State Machines Based on Structured Graph Transformation</i> Sabine Kuske University of Bremen	
	<i>A Visualization of OCL using Collaborations</i> Paolo Bottoni, Manuel Koch, Francesco Parisi-Presicce, Gabriele Taentzer Università di Roma / PSI Berlin / Technical University of Berlin	
	<i>Rule-based Specification of Behavioral Consistency based on the UML Meta-Model</i> Gregor Engels, Reiko Heckel, Jochen M. Kuester University of Paderborn	
	Paper Session 8 – Real-time and Embedded Systems	@ Windsor
	Chair: Alfred Strohmeier, Switzerland	
	<i>A New UML Profile for Real-time System Formal Design and Validation</i> L. Apvrille, P. de Saqui-Sannes, C. Lohr, P. Senac, J.-P. Courtiat ENSICA / LAAS-CNRS / Alcatel Space Industries	

Representing Embedded System Sequence Diagrams As A Formal Language
Elizabeth Latronico, Philip Koopman
Carnegie Mellon University

Scenario-Based Monitoring and Testing of Real-time UML Models
Marc Lettrari, Jochen Klose
FFIS / University of Oldenburg

12:00 – 13:00 Lunch @ Long Bar

13:00 – 14:00 **Panel** @ Essex
E Unum Pluribus? The Pros and Cons of UML Profiles
Chair: Bran Selic, Canada
Panel Members: Cris Kobryn, Colin Atkinson, Philippe Desfray, Stuart Kent

14:00 – 15:30 **Paper Session 9 – Associations and Ontology** @ Essex
Chair: Henrich Hussmann, Germany

Semantics of the Minimum Multiplicity in Ternary Associations in UML
Gonzalo Genova, Juan Llorenz, Paloma Martinez
Carlos III University of Madrid

Extending UML to Support Ontology Engineering for the Semantic Web
Kenneth Baclawski, Mieczyslaw M. Kokar, Paul A. Kogut, Lewis Hart, Jeffrey Smith, William S. Holmes III, Jerzy Letkowski, Michael L. Aronson
Northeastern University / Lockheed Martin Management and Data Systems / GRC International / Mercury Computer / Western New England College

On associations in the Unified Modelling Language
Perdita Stevens
University of Edinburgh

Paper Session 10 – Statecharts @ Windsor
Chair: Jean-Marc Jezequel, France

iState: A Statechart Translator
Emil Sekerinski, Rafik Zurob
McMaster University

Specifying Concurrent System Behavior and Timing Constraints Using OCL and UML
Shane Sendall, Alfred Strohmeier
Swiss Federal Institute of Technology
Lausanne

Formalization of UML-Statecharts
Michael von der Beeck
BMW Group

15:30 – 16:00 Nutrition break @ Essex Foyer

16:00 – 17:00 **Panel** @ Essex
UML 2.0
Chair: Cris Kobryn
Panel Member: Stewart Kent, Joaquin Miller, Bran Selic, Kerry Raymond, Jos Warmer

19:30 – 22:30 Conference Banquet @ CN Tower

Friday at a Glance	
09:00-10:00	@ Essex Keynote address: Prof. John Mylopoulos "UML for Agent-Oriented Software Development: The Tropos Proposal"
10:00-10:30	Nutrition Break @Essex Foyer
10:30-11:30	@ Essex Papers P11: Components @ Windsor Papers P12: Use Cases
11:30-12:30	@ Essex Panel: "Visual Modeling beyond UML "
12:30-12:45	@ Essex Closing Session
12:45-14:00	Lunch @ Long Bar
14:00	End of <<UML>>2001

09:00 – 10:00	Invited talk Chair: Bran Selic, Canada	@ Essex
	UML for Agent-Oriented Software Development: The Tropos Proposal John Mylopoulos University of Toronto	
10:00 – 10:30	Nutrition break @ Essex Foyer	
10:30 – 11:30	Paper Session 11 – Components Chair: Bernhard Rumpe, Germany	@ Essex
	<i>An UML Meta-Model for Contract aware Components</i> Torben Weis, Christian Becker, Kurt Geihs, Noel Plouzeau J. W. Goethe-University / IRISA	
	<i>A Specification Model for Interface Suites</i> E.E. Roubtsova, L.C.M. van Gool, R. Kuiper, H.B.M. Jonkers Faculty of Mathematics and Computing Science / Philips Research Laboratories Eindhoven	
	Paper Session 12 – Use Cases Chair Perdita Stevens, United Kingdom	@ Windsor
	<i>Against Use Case Interleaving</i> Pierre Metz, John O'Brien, Wolfgang Weber Cork Institute of Technology, Ireland / Darmstadt University of Applied Sciences, Germany	

*Estimating Software Development Effort
based on Use Cases - Experiences from
Industry*

Bente Anda, Hege Dreiem, Dag I.K. Sjøberg,
Magne Jørgensen
University of Oslo / Mogul Norway /
Simula Research Laboratory

11:30 – 12:30	Panel <i>Visual Modelling beyond UML</i> Chair: Stuart Kent Panel Members: Corin Gurr, Alan Wills, Gregor Engels, John Mylopoulos, Scott Ambler	@ Essex
12:30 – 12:45	Closing Session @ Essex	
12:45	Lunch @ Long Bar	
14:00	End of conference	

W3: Practical UML-Based Rigorous Development Methods - Countering or Integrating the eXtremists?

Organizers:

Andy Evans (University of York, UK)
Robert France (Colorado State University, USA)
Ana Moreira (Universidade Nova de Lisboa, Portugal)
Bernhard Rumpe (Technische Universität München, Germany)

W4: Concurrency Issues in UML

Organizers:

Colin Atkinson (Fraunhofer IESE, Germany)
Bruce Douglass (I-Logix, USA)
Sébastien Gérard (CEA-LIST, France)
Alan Moore (ARTISAN, UK)
Ileana Ober (Telelogic, France)
Bran Selic (Rational, Canada)
François Terrier (CEA-LIST, France)

W5: The Constraint Language for UML 2.0

Organizers:

Tony Clark (King's College, UK)
Jos Warmer (Klasse Objekten, Netherlands)
Jonas Hogstrom (Boldsoft, Sweden)

Tutorial 1

Describing Software Architecture with the UML (Monday Morning)

Instructors:

Bran Selic (Rational, Canada)

Wojtek Kozaczynski (Rational, Canada)

The presence of a solid architectural vision is a key discriminator in the success or failure of a software project. This tutorial examines what software architecture is and what it is not. It discusses and illustrates how to describe architecture through a set of design viewpoints and views and how to express these views in the UML, in the spirit of the new IEEE Standard 1471:2000: *recommended practice for architectural description*. The tutorial shows how architectures drive the development process and how to capture architectural design patterns using the UML. It is illustrated by several widely applicable architectural patterns in different domains.

Tutorial T3

A Revolution in UML Tool Use? Tool Adaptation, Extension and Integration using XMI

Instructor:

Perdita Stevens (University of Edinburgh, UK)

One of the main benefits of a unified modeling language is that it enables competition between tool vendors and allows users a wide choice of tools. Getting the most out of a tool - which is often a significant investment - means using it as more than a fancy drawing tool. It needs to fit productively into the user's software development lifecycle and indeed lifestyle.

This tutorial will discuss easy and cost-effective ways for developers to make better use of modeling tools using XMI. XMI is well known as a vendor-independent format for saving and loading UML models. What's less well known is that this technology can also make it easier than might be imagined to integrate a UML tool with other in-house or third-party tools, and even to write quick add-ons for particular tasks. We'll consider the possibilities and limitations and discuss the effect this may have on the uses of UML tools in future.

At the end of this tutorial, participants will:

- ✓ have gained a clear overview understanding of the OMG technologies XMI, MOF and UML, including how they fit together and their relevance for tool adaptation and integration
- ✓ be able to develop effective small-scale tools making use of XMI
- ✓ have considered, with help from me and other participants, the broader issues of tool integration and adaptation, and be better placed to make good decisions about these issues in their own work contexts.

Tutorial T4

From Requirements to UML Models with Use Case Maps (UCMs)

Instructors:

Daniel Amyot (Mitel Networks, Canada)

Gunter Mussbacher (Mitel Networks, Canada)

Two important aspects of future software engineering techniques will be the ability to seamlessly move from analysis models to design models and the ability to model dynamic systems where scenarios and structures may change at run-time. Use Case Maps (UCMs) are a scenario-based software engineering technique that addresses these aspects. UCMs are used as a visual notation for describing causal relationships between responsibilities of one or more use cases. A map-like diagram shows related use cases, and the progression of scenarios along use cases.

In this tutorial we intend to discuss Use Case Maps (UCMs) concepts, the UCM notation, and how UCMs fit into the software development process. The tutorial will show how UCMs address functional requirements expressed in use cases, effectively refining (or replacing) use case diagrams and activity diagrams at the system level. The tutorial will also discuss UCMs in the context of performance analysis as well as high-level design (including derivation of class diagrams and interaction diagrams from UCMs) and testing. The tutorial will include exercises for the participants and a brief demonstration of the freely available UCM Navigator tool.

Tutorial T6

Realising MDA: a Precise Meta-Modelling Approach

Instructors:

Tony Clark (King's College, UK)

Andy Evans (University of Yor, UK)

Stuart Kent (University of Canterbury, UK)

Many of the challenges raised by MDA are really challenges for language engineering. How can we define languages in a detailed and precise enough way to support automated tool generation? How can we architect and manage definitions of families of languages, for example different domain-specific flavours of PIM languages, different profiles of UML? How do we define translations between languages and transformations between models? How do we define different aspects of a language, including semantics? And so on.

This tutorial provides answers to some of these questions. Specifically, it describes a metamodeling approach, which combines object modeling with templates and a powerful extension and merging mechanism to provide consistently architected and complete definitions of languages and translations between languages. Examples used to illustrate the approach include excerpts from the 2U (Unambiguous UML) submission to the UML 2.0 Infrastructure RFP. The use of the approach in defining mappings, such as language translations, will also be examined.

The tutorial will include a demonstration of a tool which is being developed to support the approach. The tool not only provides support for the checking and validation of metamodels, but is also able to interpret those metamodels to support modeling in the languages so-defined. Both aspects will be demonstrated.

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