



Workshop on the International Project on (Formal) UML 2 Semantics

Monday, November 7, 2005
Nürnberg, Germany

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Morning Schedule

Start Time	Duration	Topic	Speaker(s)	Affiliation	Country
9:00	30 min	Project Description and Status	B. Selic	IBM Rational	Canada
9:30	45 min	The System Model	B. Rumpe	Braunschweig U. of Technology	Germany
10:15	30 min.	Coffee Break			
10:45	30 min.	Class Diagram Semantics	J. Dingel, Z. Diskin	Queen's U.	Canada
11:15	60 min.	Discussion	All		
12:15	90 min.	Lunch			

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Afternoon Schedule

Start Time	Duration	Topic	Speaker(s)	Affiliation	Country
13:45	25 min.	Dynamic Meta-Modeling -- A Hybrid Approach to Define UML Semantics	JH Hausmann, G. Engels	U. of Paderborn	Germany
14:10	25 min.	Different Notations for Describing Use Case Scenarios	G. von Bochmann	U. of Ottawa	Canada
14:35	25 min.	STAIRS - Steps to Analyze Interactions with Refinement Semantics	Ø. Haugen	U. of Oslo	Norway
15:00	25 min.	UML 2.0 Interactions: Semantics and Refinement	A. Knapp	U. of Munich	Germany
15:25	20 min.	<i>Coffee Break</i>			
15:45	25 min.	Reconciling the Needs for Semantics and Validation in MDD	S. Graf	VERIMAG	France
16:10	25 min.	An ASM Semantics for the Communication Mechanisms in Rational Rose RT	S. Leue	U. of Konstanz	Germany
16:35	25 min.	Diagrams for Services -- Queries and Constraints	I. Krueger	U. of California San Diego	USA
17:00	15 min.	Wrap Up Session	B. Selic	IBM Rational	Canada
17:15		End of Official Workshop			
17:15	60 min.	Q&A Session on UML 2.0 (optional)	B. Selic	IBM Rational	Canada
18:15		Closing			

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QUESTIONS?

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The UML 2.0 Semantics Project - Project Overview -

- IBM (Canada, Germany, Israel)
- Queen's University (Canada)
- Technical University of Munich (Germany)
- Braunschweig University of Technology (Germany)

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Outline

- **Project Parameters**
- **Objectives**
- **Phasing and Schedule**
- **Status**
- **Next steps**

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Project Parameters

- **Duration: 2 years**
 - January, 2005 through December, 2006
- **Funding: CDN\$ 460,000 (+)**
 - IBM (Rational (Canada), Software Group (Germany), Research (Haifa))
 - Government of Ontario: Ontario Centres of Excellence (OCE Inc) – Communications and Information Technology of Ontario (CITO)
 - Technical University of Munich
- **Participants:**
 - IBM Rational SW Canada (B. Selic), IBM SW Germany, IBM Research Israel (Dr. A. Hartman)
 - Queen's University (Prof. J. Dingel, M. Crane, Dr. Z. Diskin)
 - Technical University of Munich (Prof. M. Broy, Dr. M.V. Cengarle, Dr. J. Jürjens)
 - Braunschweig University of Technology (Prof. B. Rumpe)

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Objectives

- **To develop a mathematically formal model that specifies the semantics of UML 2**
- **Purpose:**
 - Precise definition of key UML concepts (required to support MDD based on UML)
 - Detect errors and ambiguities in the UML standard
 - To support formal processing of UML models (analysis, transformation, validation, verification, synthesis)
 - To support executable modeling

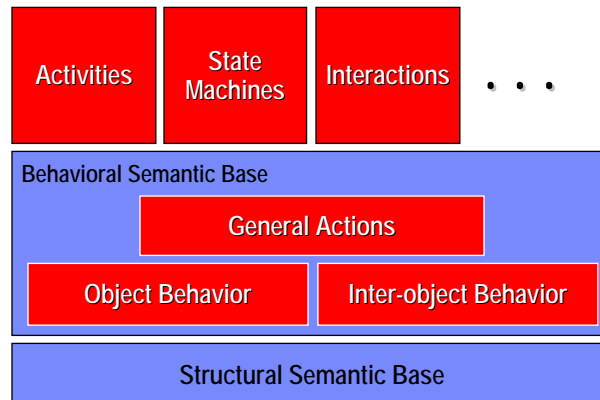
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Phasing and Schedule

- **Phase I: Foundations (1st year)**
 - Formal model of the basic structural and behavioral concepts expressed in mathematical form
 - Study of potential approaches to formal analysis
 - Preliminary version of UML virtual machine
- **Phase II: Extension and Validation (2nd year)**
 - Models of selected higher-level formalisms (state machines, activities)
 - Techniques for formal analysis of models
 - Refined version of UML virtual machine

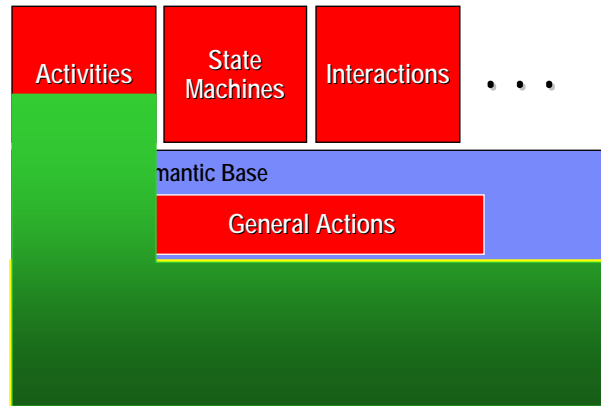
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The Problem



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Status (1)



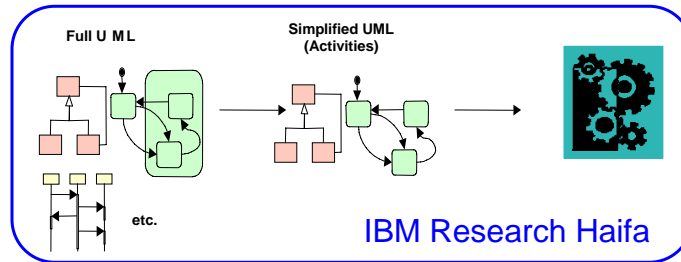
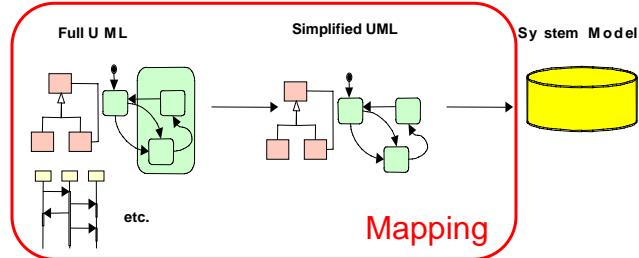
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Status (2)

- **System model (prime: TUM, UTB)**
 - Structural part (almost complete)
 - Execution control (half done)
 - State transition behavior (initial version)
- **Mapping of UML abstract syntax concepts to system model of class diagrams (Queen's)**
 - Semantic mapping of UML::Kernel concepts (initial version)
- **Classification of actions (IBM, Queen's, Exec. UML team)**
- **UML virtual machine prototype (IBM Research Haifa)**

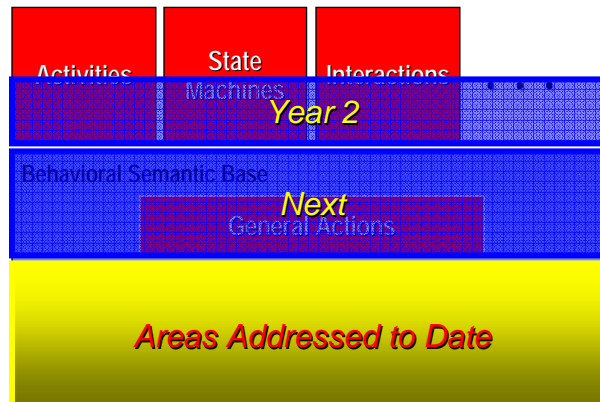
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Status (3): The Relationship Between the Parts



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Next Steps (1)



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Next Steps (2): Near Term

- **Complete UML to SM mappings for areas covered**
 - Identify spec issues
- **Integrate semantics into UML virtual machine prototype**
 - Use VM as an experimental testbed
- **Collaboration with Executable UML Foundation submission team**
 - Formal definition of core actions

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Next Steps (3): Phase II Work

- **Formal definition of higher-level behavioral formalisms**
 - Statecharts
 - Key elements of interactions
 - Activities (from UML VM work)
- **Formal analysis techniques**
 - Define framework
 - Identify promising techniques
 - Experiment

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Conclusions

- **Project is in a unique situation:**
 - High-level of expertise in key areas (formal modeling, UML)
 - Direct link to standardization teams
 - Link to major UML tool vendor
 - Funding level
- **Significant progress has been made**
 - But, somewhat behind original objectives (75-80%)
 - Follow on projects are likely
- **Interested in collaboration with other teams working on same or related research**