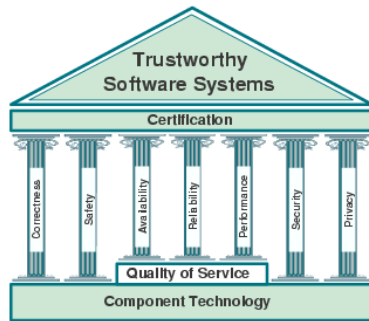


Model-Driven Performance Measurement and Assessment with MoDePeMART



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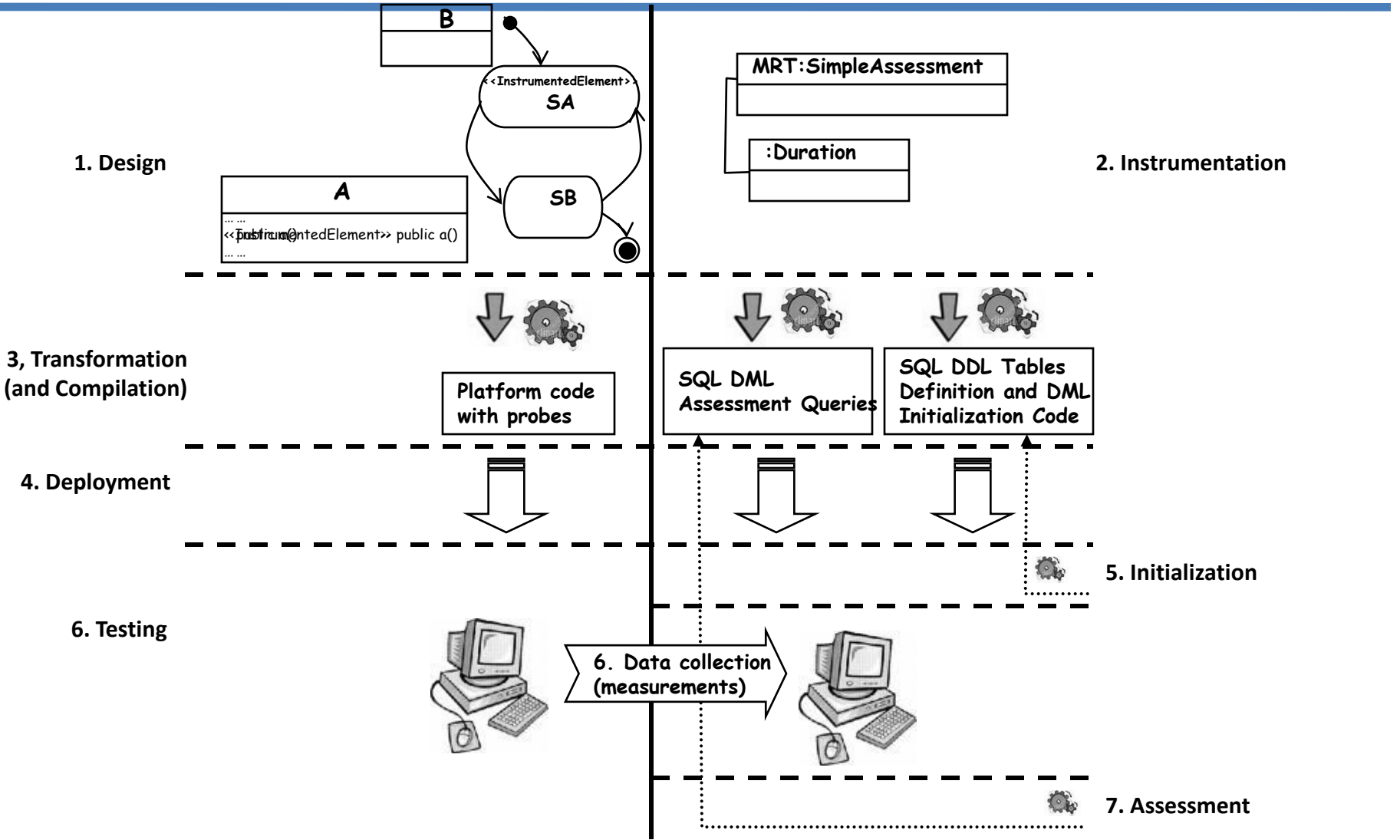
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- Current research is mostly dedicated to the performance prediction
- Problems with measurement
 - Differences between modeling and implementation constructs
 - Performance analysts usually are not experts in design modeling languages
 - Inconsistency between data structures for data collection and metrics computation



- Software Performance and Evaluation
- Modeling Dimensions
- The Metamodel
- Evaluation
- Future work

- Software Performance is the degree to which a software system or component meets its objectives for timeliness

(C.U. Smith and L.G. Williams, A Practical Guide to Creating Responsive Scalable Software, AW 2001)

- Performance metrics
 - Response time (min, max, ddistribution...)
 - Throughput (jobs/sec)
 - Utilization

- Software Performance and Evaluation
- Modeling Dimensions
 - Transformational Modeling Dimension
 - Reactive Modeling Dimension
- The Metamodel
- Evaluation
- Future work

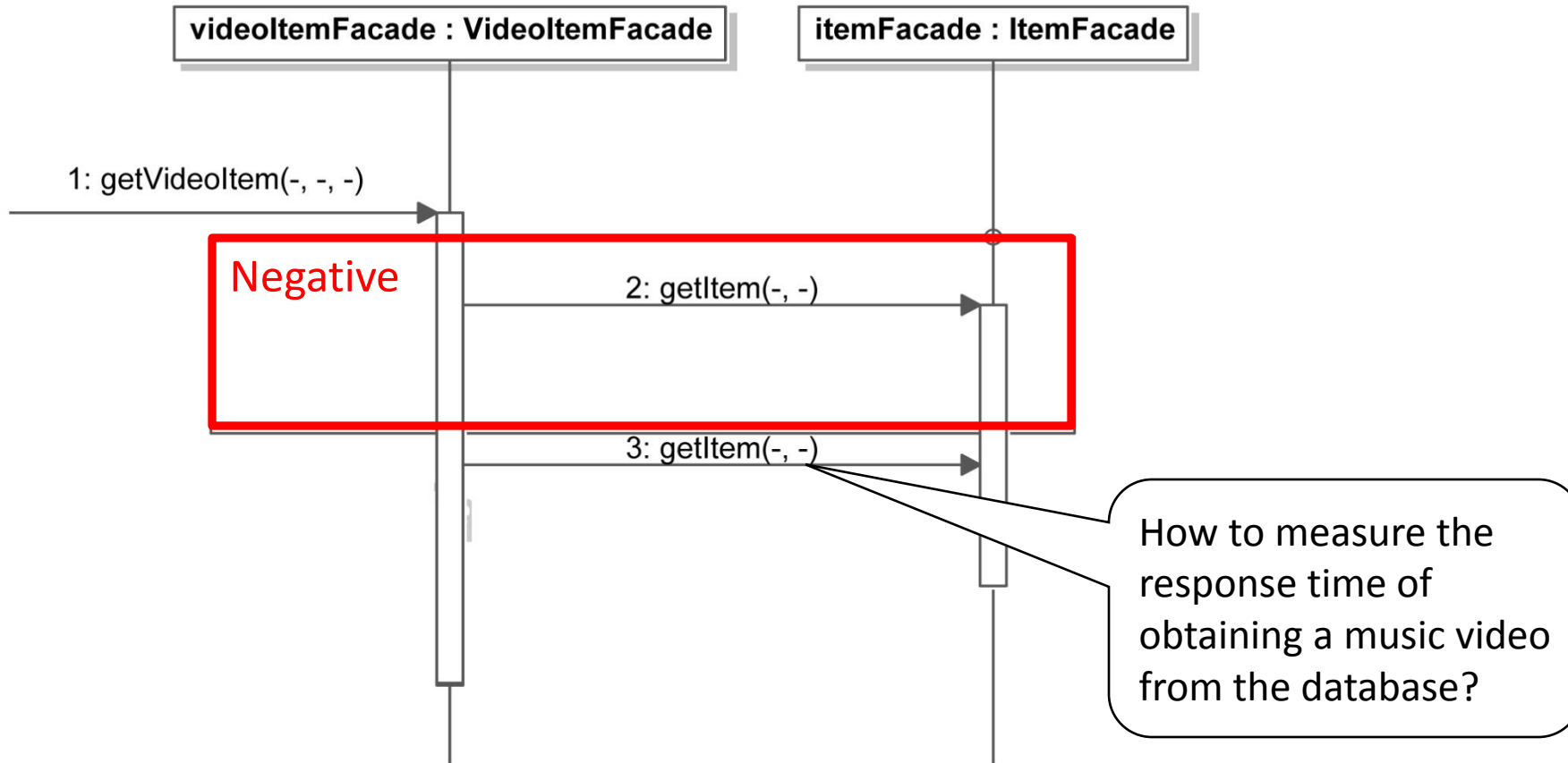


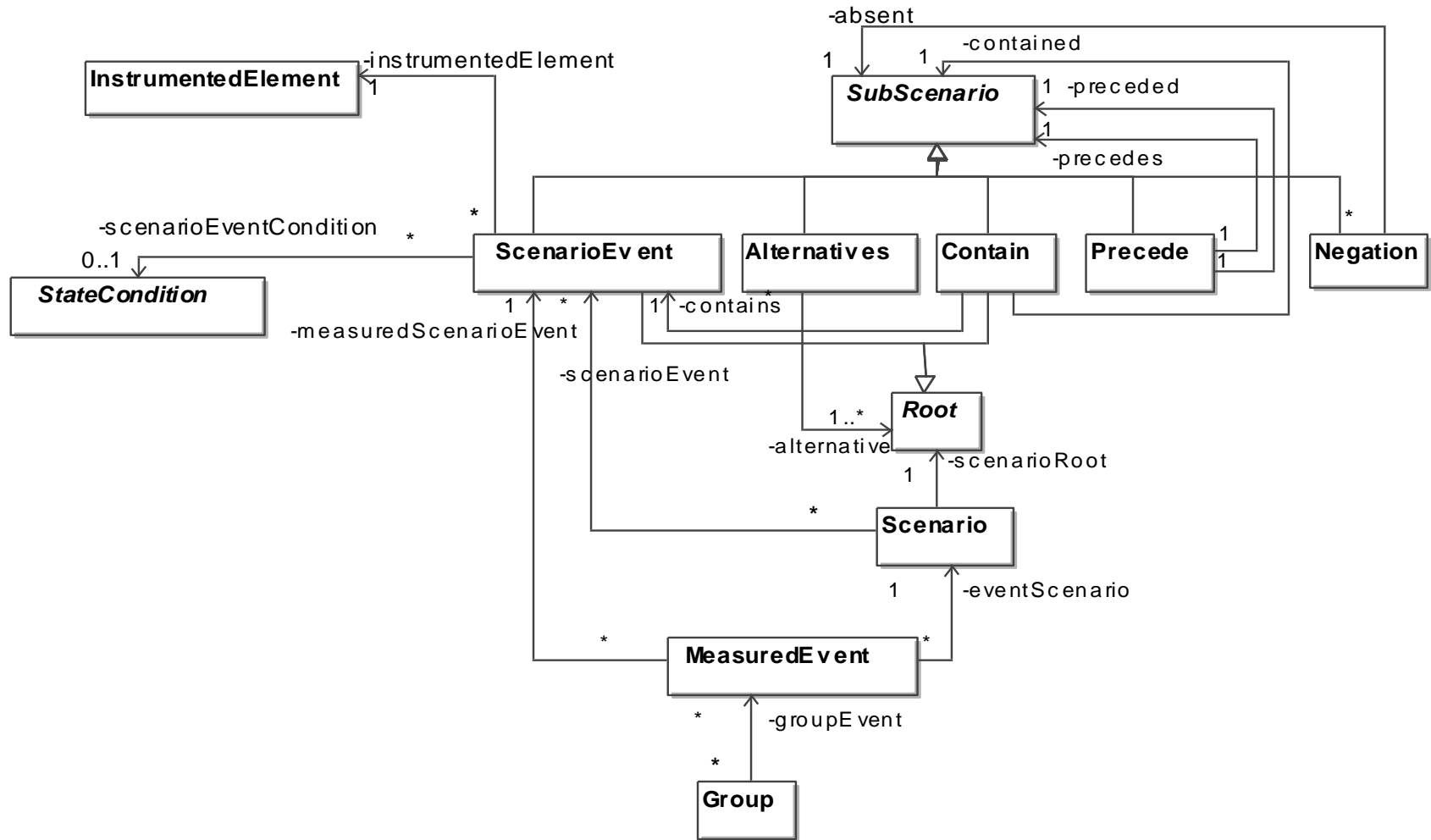
Transformational Modeling Dimension

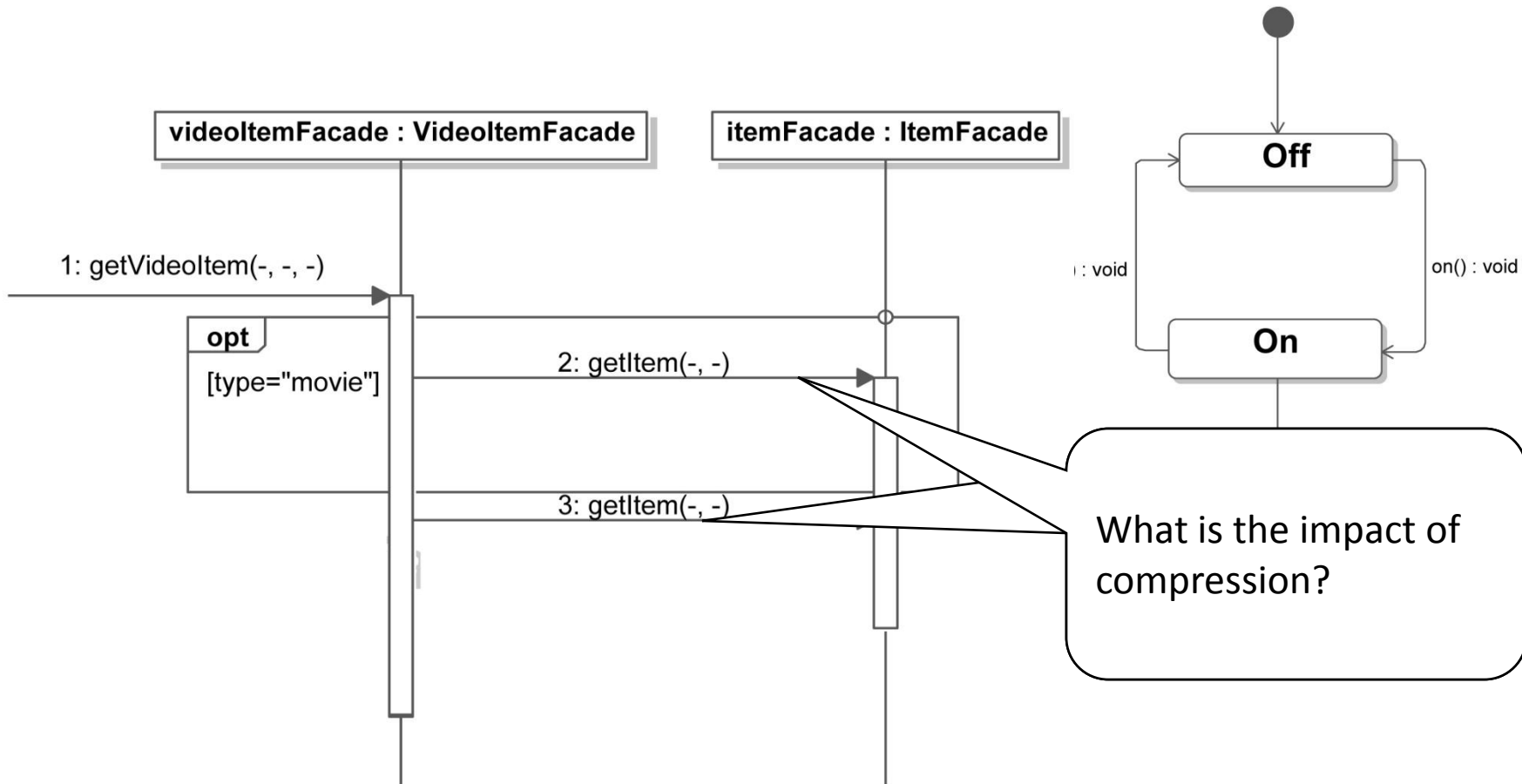
- Algorithmic problem decomposition
(E. Dijkstra, *A Discipline of Programming*. Prentice Hall PTR, 1979)
- Modeling constructs:
 - Simple commands
 - Composite commands (command block)
 - Invocation and sequential composition
 - Guarded command (if (c), opt (UML))
 - Guarded command set (switch (C), alternative(UML))
 - Loop

- Stimulus/response behaviour
- Response depends on stimuli and current state
- Modeling constructs:
 - States
 - Transitions
 - Stimuli/signals

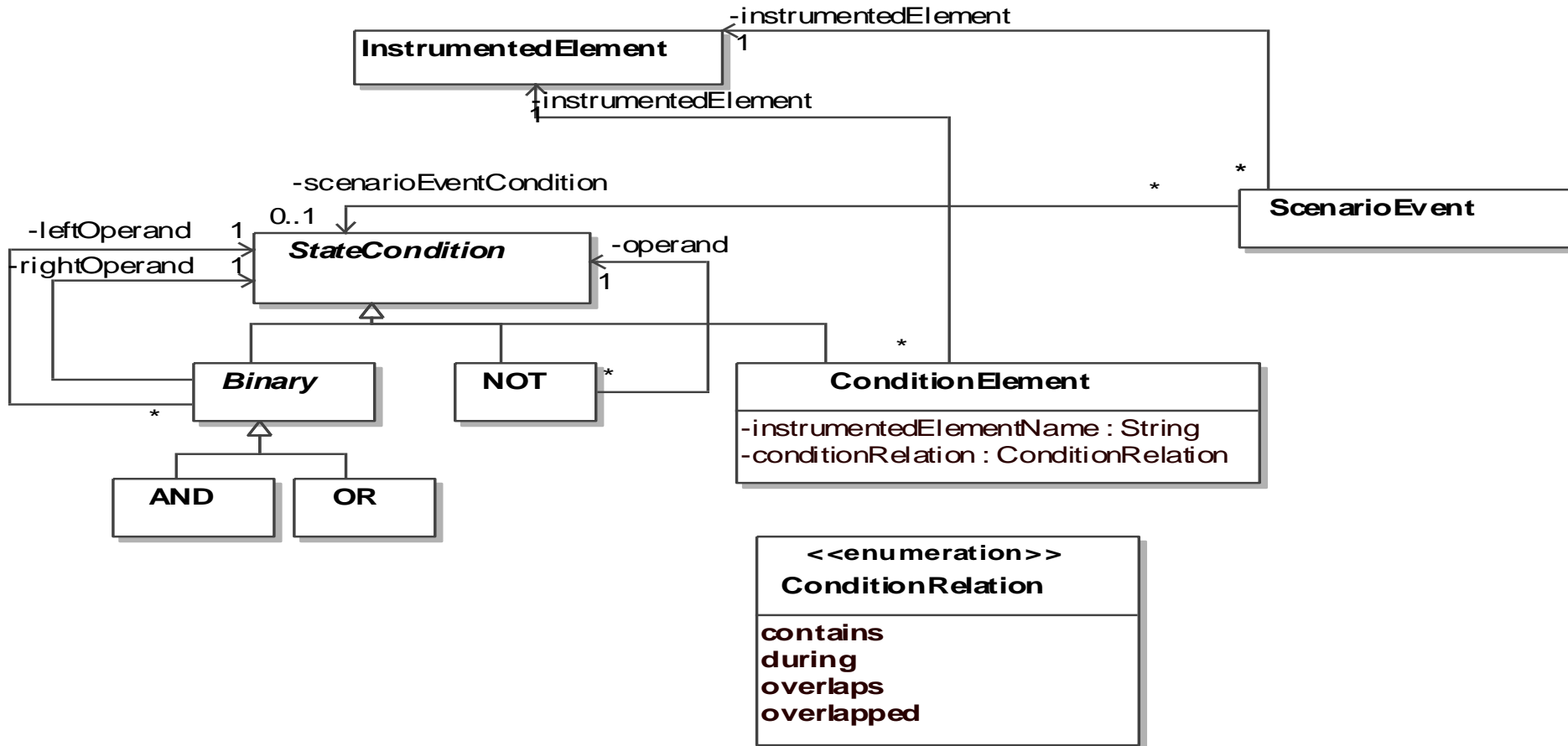
- Software Performance and Evaluation
- Modeling Dimensions
- Metamodel
 - Transformational context and metamodel part
 - Reactive context and metamodel part
 - Assessment and metrics metamodel part
- Evaluation
- Future Work







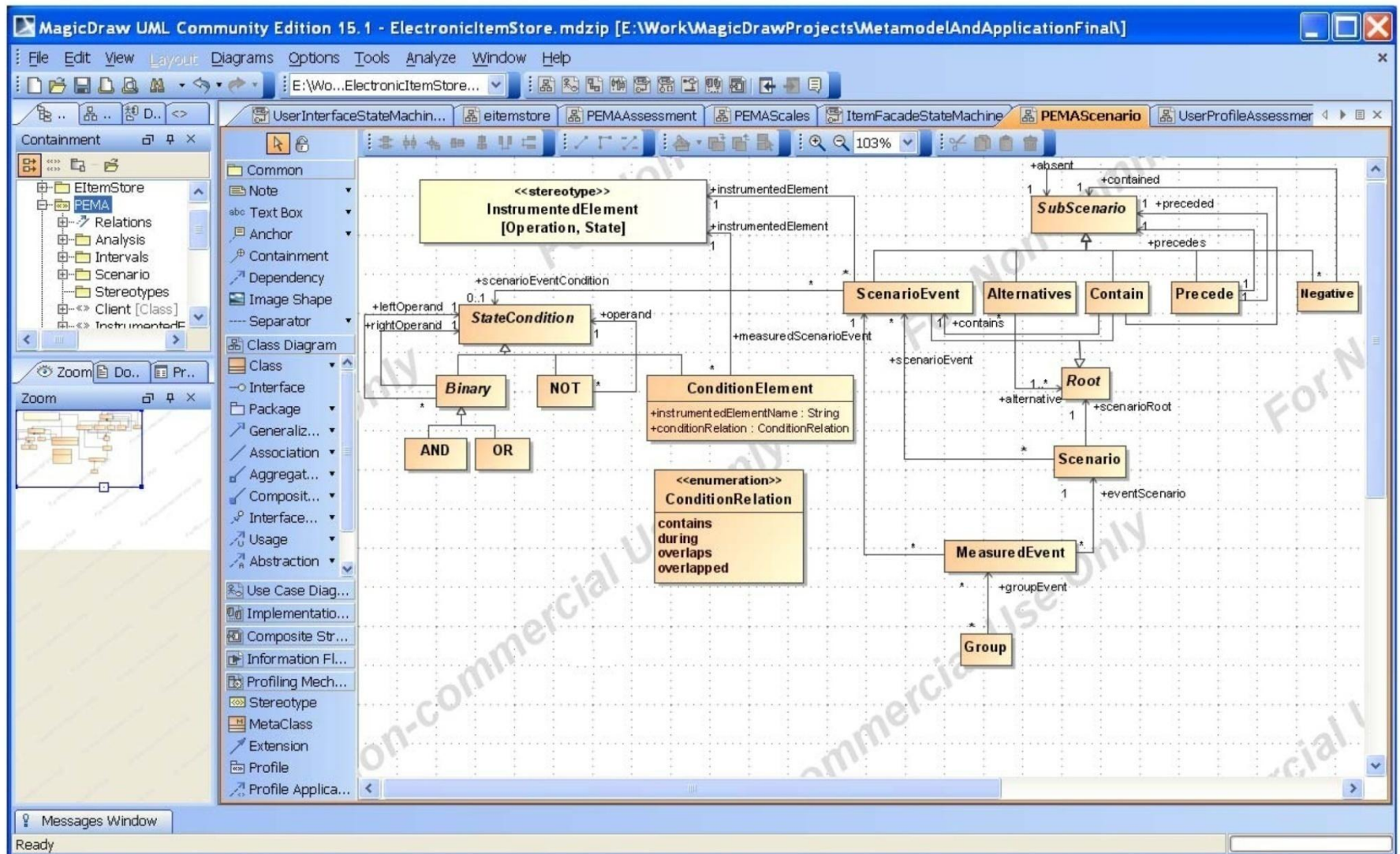
Reactive Context Metamodel



- Metrics metamodel part
 - Duration (min, max, stdev, percentile, ddistribution)
 - Occurrence rate
 - Percentage
- Assessment
 - Simple
 - Composite
 - Specification of validity period

- Software Performance and Evaluation
- Modeling Dimensions
- The Metamodel
- Evaluation
 - PEMA Profile
 - Comparative Analysis
 - Limitations
- Future work

- Class Diagrams and State Diagrams
- Implementation in Magic Draw
- Target platforms are JavaRMI and MySQL
- Transformation with openArchitectureware



Measurement and Assessment Concern Approach	Response time statistical analysis	Throughput	Workload characteristics (number of requests, request rate, pattern)	Path characteristics (probability in branching, loop iteration numbers)	Isolation of critical business tasks	Specification of execution context (transformational and reactive)	Metrics validity period specification	Instrumentation transparency	Measurement and metric computation data types consistency	Measurement points reduction
Klar et al. [12]	+	-	-	-	o	o	-	+	+	+
Liao and Cohen [13]	+	-	+	o	o	o	-	+	+	+
Hollingsworth et al. [14]	+	+	++	o	o	o	-	+	+	+
The Open Group [15]	-	-	-	-	o	+	-	-	+	-
Marenholz et al. [16]	-	-	-	-	o	o	-	+	-	+
Debusman and Geihs [17]	-	-	-	-	o	o	-	+	+	+
Diaconescu et al. [18]	+	+	-	-	o	-	-	+	+	-
MoDePeMART	+	+	++	+-	+	+	+	+(o)	+(o)	+

Comparative analysis of related work
 + facilitated, - not facilitated, o partially facilitated

- Applicable in systems with non–communicating concurrency
- Synchronous communication
- Scenarios without loop-backs
- Granularity of the timing mechanism is larger than the execution of one command
- Job flow assumption
- Arrival patterns recognition is not supported
- Data assessment is not supported

- Metamodel extension
 - Utilization
 - Data assessment
 - Loop iteration number
 - Arrival patterns
- Profile development
 - Usage of suitable diagrams
 - Application to Activity Diagram
- Use for monitoring

Thank you for your attention!
Comments&Questions?