Model Scalability through a Model Recording and Inference Engine

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BACKGROUND
• Models used in software development often need to be scaled to satisfy the growing workload and system enlargement demands.

• How to scale up models from a base state to a complex state?

RESEARCH GOAL
• Design and implement a new approach to simplify the implementation of model scalability, so that general end-users are enabled to realize model scalability tasks in an automated manner, without knowing any model transformation languages or metamodel definitions.

CASE STUDY
• The example is based on the Event QoS Aspect Language (EQAL), a Domain-Specific Modeling Language (DSML) for graphically specifying publisher-subscriber service configurations for large-scale systems.

• The scaling task requires the addition of new Sites, Gateways, Channels and their corresponding connections.

• We select an instance with 3 sites, and demonstrate how to scale it up to 4 sites by manually adding new elements and updating attributes.

RESULTS & CONCLUSION
• No model transformation languages are used and the generated transformation patterns are invisible to users. Therefore, users are completely isolated from knowing a model transformation language and the metamodel definition.

• We have applied our approach to successfully implement several practical model scalability tasks in different domains, without writing any transformation rules or codes, showing improvement in the efficiency and simplicity.

• To evaluate the approach, the following provides a comparison of a model scalability effort that was performed using a model transformation engine (in this, case C-SAW), to that using MTBD.

<table>
<thead>
<tr>
<th>Scalability Example</th>
<th>MTBD</th>
<th>C-SAW Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling up Stochastic Reward Nets Models</td>
<td>36 operations</td>
<td>170 SLOC</td>
</tr>
<tr>
<td>Scaling up Event QoS Aspect Models</td>
<td>17 operations</td>
<td>32 SLOC</td>
</tr>
</tbody>
</table>

• As future work, we will investigate how to ensure and check whether a demonstration truly reflects the desired scaling tasks, as well as how to debug the generated transformation.