Semantic Accountable Matchmaking for E-Science Resource Sharing

Zeqian Meng
Rizos Sakellariou
School of Computer Science, The University of Manchester

John Brooke
JMB Associates Ltd. Manchester
Introduction | Motivation

resource sharing management for e-Scientists’ collaboration

e-Scientists

resource supplying infrastructures
Introduction | Motivation

Present
- technical twists partly via standards

Past
- isolated infrastructures

Future
- dynamic resource supply via open standards

resource sharing management for e-Scientists’ collaboration

e-Scientists

resource requesting organisation

resource supplying organisation

resource supplying infrastructures
Introduction | Motivation

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dynamic & customised resource supply

fine-grained accountable resource sharing (per job)

coarse-grained resource management
Introduction | Motivation

Classification of Virtual Organizations [3]

Introduction | Main question

How to realise fine-grained accountable resource sharing?
Contributions

• A standard-based information model for fine-grained resource management

• An implementation of the information model (independent organizations, new lifecycle)
Methodology

- Extension upon GLUE 2.0
  (Glue Laboratory Uniform Environment 2.0)
- Semantic modeling & reasoning
- Implementation upon Amazon Web Services
Results | Semantic model

OWL 2 (Web Ontology Language 2)
Results | Semantic reasoning

Pellet: open source, Java-based
Results | Implementation

Implementation design
Results | Evaluation

✔ Functionalities:
-- application- & resource-oriented matchmaking
-- balance updates
-- no resources returned with un-sufficient balance
-- members’ privileges for matchmaking
Results | Evaluation

✔ Performance: pure reasoning duration
-- a group with 15 members
-- 2 instances for application-oriented matchmaking
-- 4 instances for resource-oriented matchmaking
Results | Evaluation

✔ Performance: pure reasoning duration
-- application- & resource-oriented matchmaking (S1&S2)
-- balance updates (S1)
-- no resources returned with un-sufficient balance (S3)
-- members’ privileges for matchmaking (S5)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
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<tbody>
<tr>
<td>Mean (ms)</td>
<td>267.10</td>
<td>279.33</td>
<td>272.93</td>
<td>280.83</td>
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<tr>
<td>Deveation (ms)</td>
<td>74.45</td>
<td>74.37</td>
<td>72.54</td>
<td>59.11</td>
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</table>
Conclusion

- A semantic model extended from GLUE 2.0
- Reasoning programs upon the model
- Evaluation over Amazon Web Services
- Testbed: negotiable and accountable resource sharing
Hypotheses

• To form and dissolve resource supply in a dynamic & independent manner
• Fine-grained accountable resource sharing
• To allow analysis of algorithms for performance
References

Thank you
Contact:
Zeqian Meng
zeqian.meng@manchester.ac.uk