Tele Assistance: A Self-Adaptive Service-Based System Exemplar

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Contribution

• A reference implementation of a Tele Assistance System (TAS) application

• Predefined adaptation scenarios

• Environment for developing new exemplars
Outline

• Motivation
• Description of the exemplar
• Adaptation scenarios
• Realization
• Using TAS
• Conclusions
Motivation

• Exemplars as drivers for research in our field supporting the comparison of alternative approaches

• Service-based systems are widely used in practice

• These systems increasingly rely on self-adaptation to cope with the uncertainties associated with third-party services
Originally introduced by Baresi et al. IET [2007]

Used in several adaptation efforts [ICSE09, TSE11, CACM12]
## Adaptaion Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Type of uncertainty [13]</th>
<th>Type of adaptation [2]–[4], [8], [10]</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Unpredictable environment: service failure</td>
<td>Switch to equivalent service; Simultaneous invocation of several services for idempotent operation</td>
</tr>
<tr>
<td>S2</td>
<td>Unpredictable environment: variation of service response time</td>
<td>Switch to equivalent service; Simultaneous invocation of several services for idempotent operation</td>
</tr>
<tr>
<td>S3</td>
<td>Incomplete information: new service</td>
<td>Use new service</td>
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<tr>
<td>S4</td>
<td>Changing requirements: new goal</td>
<td>Change workflow architecture; Select new service</td>
</tr>
<tr>
<td>S5</td>
<td>Inadequate design: wrong operation sequence</td>
<td>Change workflow architecture</td>
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</tbody>
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### Quality attribute Metrics

<table>
<thead>
<tr>
<th>Quality attribute</th>
<th>Metrics</th>
</tr>
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<tbody>
<tr>
<td>Reliability</td>
<td>Number of failed service invocations&lt;br&gt;Number of specific operation sequence failures&lt;br&gt;Mean time to recovery</td>
</tr>
<tr>
<td>Performance</td>
<td>Number of specific operation sequences exceeding allowed execution time</td>
</tr>
<tr>
<td>Cost</td>
<td>Cumulative service invocation cost over given time period</td>
</tr>
<tr>
<td>Functionality</td>
<td>Number of faulty process executions</td>
</tr>
</tbody>
</table>
Small Demo
Using TAS

• Select/define:
  – scenario, requirements, metrics
  – service and input profiles
  – probes and effectors

• Execute and compare results
Conclusions

• Reference implementation for TAS that aims to:
  – Promote understanding among researches in self-adaptive systems; focus on service-based systems
  – Allows comparing self-adaptation approaches
  – Advance research and practice of our field

  –  http://homepage.lnu.se/staff/daweaa/TAS/tas.htm

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