Service-Oriented Trust and Reputation Management System for Multi-Tier Cloud

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Outline

• Introduction
• Background
• Proposal
• Analysis
• Conclusion
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- SaaS
- PaaS
- IaaS

Customer

Data Center 1

Data Center 2

Service Provider

Transmission

Operation

Power Generator

Power Generator

Market

Distribution
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Problem?

- Maximizing the trust and minimizing the cost for the customers

Contribution?

✓ Formulate the problem
✓ Propose a platform for the TRM system in Cloud
  ✓ Target: Service delivery
  ✓ Model: Multi-layer/tier Service Providers
✓ Choosing the best provider: an application of the TRM system
✓ Considering NIST & CSA: Definition, SLA, CloudTrust Protocol, PLA
Credits


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Background

- History of trust
- Trust in social science
- Trust in e-commerce
- Trust in e-banking
- Trust in information and communication technology (ICT)
- ICT applications: Health care, smart grid, cloud computing ...
- More, in: ICN/CCN, Identity federation
## Definitions

- Trustor and trustee
- Direct and indirect trust
- Punishment
- Recommendation
- Reputation
- Trust and Reputation Management (TRM) system
- Central and Distributed TRM systems
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<table>
<thead>
<tr>
<th>No</th>
<th>Task Description</th>
<th>Algorithm</th>
<th>CSC</th>
<th>CSP</th>
<th>TCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>1.</td>
<td>Set the target price</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Prepare an RFQ and send the RFQ to CSPs</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Prepare the quote including different scenarios and send quote to the CSC</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Calculate the trust value of each scenario</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Choose the scenario that delivers the maximum trust</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Checks the maximum trust value vs. acceptable one</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Contract with the selected CSP for the service</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Informs TCE about the quality of received service</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Updates database of TCE</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
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Analysis

- **Security Analysis**
  - Secure versus most of the TRM attacks

- **Implementation tip**
  - Role of $F_{nT}(.)$
  - CSC interests

- **Applicability:**
  - Affect of the target price

![Trust](image)

CSP selection in different price settings

(a) First price setting: Too low
(b) Second price setting: Too high
(c) Third price setting: Reasonable
Conclusion

- Maximizing the trust and Minimizing the cost.
- We formulated the problem in a multi layer chain of CSPs.
- Proposed an efficient and practical TRM framework.
- It dynamically can be adapted to the service and countermeasures that are required by the CSC.
- Our analysis showed that our system is secure to be used and reliable in cloud.
- To extend: Adding cost minimization approaches; designing $F_{nT}(.)$; using this system to reduce the influence of the CSP with low trust value in order to have less impact on the trust value of the chain.
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Thank you!

Questions?