Recommending Cloud Service Providers

Organizational criteria for Cloud Service Provider selection

Thesis presentation

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Selection criteria, examples

- Organizational factors
  - vendor lock in, portability, support
  - security, privacy, compliance
  - service portfolio, operating system

- QoS
  - elasticity, reliability, inter-operability

- Functional requirements

- Costs
  - cost per unit, pricing options, contract options
  - Metering and billing process
Additional organizational criteria

• Most decision support models focus on criteria for
  – functional requirements
  – quality of service (QoS) and
  – Cost

• Support for operational service composition

• To make a better choice, organizational criteria have to be taken into account in the selection process
Research Question

• How to evaluate organizational factors in the selection of a CSP?

  – RQ-A: What organizational factors are important for CSP selection?

  – RQ-B: How to integrate these factors in a selection process (for a specific IaaS use case)?
Research plan

• Analysis of CSP selection models
• Inventorize and model additional organizational criteria
  • Analysis of organizational criteria
  • Model/cluster these criteria
  • Validate criteria and model (expert interviews)
• Apply the organizational criteria to a selection process of one IaaS use case
  • Case study, evaluate validity of organizational criteria
Focus / limitation of complexity

- Public IaaS

- IT companies, SME (Small and Medium Enterprises)

- Use case for case study: system development
Expected research results

• A set of organizational criteria for CSP selection, in addition to selection criteria for
  – functional requirements
  – quality of service (QoS) and
  – cost

• A framework for the organizational criteria

• A recommendation on integrating these criteria into the CSP selection process
Analysis of CSP selection models
Sources

• ** Academic studies**
  - MCDM (multi criteria decision methods) for service selection
  - Cloud supplier selection (preferred supplier, business related)

• **Research organization (profit/non profit)**
  - Gartner research (enterprise, business related)
  - CSMIC Service Measurement Index
  - EU-studies (partnership with companies, FP7 and Horizon 2020)
  - Standardization organizations (ENISA, ETSI, NIST, CSA)

• **Commercial sources**
  - Providers (whitepapers, tutorials, user guides)
  - Brokers (consultants and systems, e.g PlanFor Cloud)
  - Cloud management application providers (e.g. Flexiant)
Analysis of CSP selection models
Criteria clustering (1)

Mutual topics

- Cloud Service itself, availability, performance, agility
- Costs of cloud service, pricing, billing
- Security and privacy / compliance / governance
- Support / usability
- Interoperability and portability
- Viability of CSP
Analysis of CSP selection models
Criteria clustering (2)

Selection process / Decision level / business relation / Granularity of criteria

• Strategic selection
  (long term goal setting)
  • evaluate viability and portfolio of supplier

• Tactical selection
  (project/use case initiation)
  • preferred supplier selection

• Operational selection
  (design/build time)
  • preliminary match of IaaS with
    functional requirements, QoS, cost
  (run time)
  • select IaaS for deployment
## CSP selection

### Criteria framework (structure)

<table>
<thead>
<tr>
<th>Criteria cluster</th>
<th>Sustainability</th>
<th>CSP-Client relationship</th>
<th>Cloud service</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision level</td>
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<td>Strategic</td>
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<td>Tactical</td>
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<td>Operational</td>
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CSP selection criteria framework

<table>
<thead>
<tr>
<th>Criteria Cluster</th>
<th>CSP Client-Relation</th>
<th>Cloud Service as a Product</th>
<th>Compliance</th>
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</thead>
<tbody>
<tr>
<td>Strategic Decisions</td>
<td>Location, Viability, Partnership</td>
<td>Service development strategy of cloud provider</td>
<td>Compliance and governance capability</td>
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<tr>
<td>Tactical Decisions</td>
<td>Exit/entry support and portability</td>
<td>Service portfolio, self service and billing</td>
<td>Certification / auditing</td>
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<tr>
<td>Operational Decisions</td>
<td>Operational support &amp; interoperability</td>
<td>service: functional requirements</td>
<td>Operational governance</td>
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<td>Green data center</td>
<td>service: QoS</td>
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<td>Social responsibility</td>
<td>service: Cost</td>
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Topics / criteria clustering

Clusters are recognized; remarks from expert interviews:

- **Cloud service**
  - Weight of criterion is very use case specific
  - Cloud deployment with full scalability and self service provisioning is still difficult
- **Compliance**
  - Chain liability is a challenge
  - Privacy issues depend on use cases / core business
- **CSP-customer relation**
  - Periodic evaluation of provider (changes of service, requirements or environment)
  - Personal support is important
- **Sustainability:**
  - Concern for CSP: cost savings and company profile
  - More important for public/non profit clients?
CSP selection
Validation of criteria framework (2)

Distinction of decision levels

Distinction of decision levels and involved parties is recognized; remarks from expert interviews:

• Levels are generally acknowledged and familiar but not made explicit in practice
• Decision process is iterative and across different levels
• Focus of IT department at operational and tactical level
CSP selection
Requirements for recommendation

Challenges:
• Scoring method for the (aggregate) criterion: metrics
• Relative weight of criterion: depends on customer organization and use case
• Service offerings from CSP: equivalent and validated?

selection of CSP
CSP selection

Improvement of selection process (1)

Use of selection criteria and metrics

• Criteria and metrics for decisions at operational level are available

• Criteria for strategic and tactical level decisions are known but not well defined nor structured; use of criteria framework

• Define metrics for the criteria
CSP selection

Improvement of selection process (2)

Organization of selection process

• Organize selection process with distinction of decision levels and clusters in mind

• Define internal governance process across organizational levels