A Framework for Processes Submission and Monitoring from Mobile Devices to Grid Configurations Utilizing Resource Matching

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Guide

- Introduction
- Related Works
- Concepts
- Framework
- Case Study
- Conclusions
- Future Works
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Introduction (1/2)

- Limitations of mobile devices impose great difficulties to provide to users an option for solve complex problems (Mobile Grid);

- The majority of researches only allow submission and monitoring of a task per time from device;

- Moreover, there is necessity to select grid resources for applications execution;

- It is difficult to establish agreements on used terms to characterize resources and requests (Resource Matching based Ontology).
Introduction (2/2)

4 Jobs for resolution problem

Services of
Jobs Submission and
Monitoring
## Related Works

<table>
<thead>
<tr>
<th></th>
<th>Resource Matching (Ontology)</th>
<th>Workflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shi et al. 2006</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Sajjad et al. 2005</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Grabowski et al. 2006</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Brooke and Parkin 2005</td>
<td>NO</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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Concepts

- **Workflow:**
  - represent a *execution flow* which data are passed between some tasks obeying rules previously defined.

- **Ontology:**
  - Ontology can be expressed as a *formal and explicit specification from a shared concept.*
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Framework
Framework – Portal (2/6)

Application Monitoring Interface
Framework – Workflow Manager (3/6)

1: inicializaThread()
2: load(fileName:String)
3: start()
4: string := getResources()
5: statusMonitoringEvent(e: StatusMonitoringEvent)
6: updateXMLfile()
Framework (4/6)

Automation e Coordination

PORTAL (basic functions, personalized e optimized)

Services of Workflow Submission and Monitoring
Frame - Resource Selector (5/6)

- Ontology-based Matchmaker
  - Matchmaking Rules
    - Domain Background Knowledge
      - Domain Ontologies (Resources, Policies, Requests)
  - Rule-based Inference Engine (Jena/ARQ/Pellet)
Framework – Resource Selector (6/6)

- Characteristics:
  - Flexible and extensible;
  - Resource Matching;
  - Checking information consistency;
  - Asymmetric description.
## Description of resources requests of workflow tasks

<table>
<thead>
<tr>
<th>Requirements</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job_Request.request_id</td>
<td>query_T1</td>
<td>query_T2</td>
<td>query_T3</td>
<td>query_T4</td>
</tr>
<tr>
<td>Job_Request.owner</td>
<td>vinicius</td>
<td>vinicius</td>
<td>vinicius</td>
<td>vinicius</td>
</tr>
<tr>
<td>Job_Request.decrescent_order</td>
<td>total_main_memory</td>
<td>-</td>
<td>processor_capacity</td>
<td>processor_capacity</td>
</tr>
<tr>
<td>Job_Request.number_resources_return</td>
<td>= 1</td>
<td>= 1</td>
<td>= 1</td>
<td>= 1</td>
</tr>
<tr>
<td>Job_Request.Mem.total_main_memory</td>
<td>&gt;= 1024 MB</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Job_Request.Proc.processor_capacity</td>
<td>-</td>
<td>-</td>
<td>&gt;= 3000 MHz</td>
<td>&gt;= 3000 MHz</td>
</tr>
<tr>
<td>Job_Request.software_id</td>
<td>S1</td>
<td>S2</td>
<td>S3</td>
<td>S4</td>
</tr>
<tr>
<td>Job_Request.database_id</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requirements</th>
<th>T5</th>
<th>T6</th>
<th>T7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job_Request.request_id</td>
<td>query_T5</td>
<td>query_T6</td>
<td>query_T7</td>
</tr>
<tr>
<td>Job_Request.owner</td>
<td>vinicius</td>
<td>vinicius</td>
<td>vinicius</td>
</tr>
<tr>
<td>Job_Request.decrescent_order</td>
<td>-</td>
<td>total_main_memory</td>
<td>processor_capacity</td>
</tr>
<tr>
<td>Job_Request.number_resources_return</td>
<td>= 1</td>
<td>= 1</td>
<td>= 1</td>
</tr>
<tr>
<td>Job_Request.Mem.total_main_memory</td>
<td>-</td>
<td>&gt;= 2048 MB</td>
<td>-</td>
</tr>
<tr>
<td>Job_Request.Proc.processor_capacity</td>
<td>-</td>
<td>-</td>
<td>&gt;= 3000 MHz</td>
</tr>
<tr>
<td>Job_Request.software_id</td>
<td>S5</td>
<td>S6</td>
<td>S7</td>
</tr>
<tr>
<td>Job_Request.database_id</td>
<td>-</td>
<td>DB1</td>
<td>DB2</td>
</tr>
</tbody>
</table>
## Case Study

**Grid resources that attend workflow tasks**

<table>
<thead>
<tr>
<th>Computer System Characteristics</th>
<th>Resource (a)</th>
<th>Resource (b)</th>
<th>Resource (c)</th>
<th>Resource (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USC.address_ip</td>
<td>140.68.107.10</td>
<td>150.162.56.12</td>
<td>147.160.50.37</td>
<td>140.68.87.50</td>
</tr>
<tr>
<td>USC.authorized_account</td>
<td>vinicius; parra</td>
<td>mario; vinicius</td>
<td>vinicius</td>
<td>vinicius; parra; mario</td>
</tr>
<tr>
<td>USC.Memory.total_main_memory_size</td>
<td>16384.0 MB</td>
<td>1018.4 MB</td>
<td>768.0 MB</td>
<td>3062.0 MB</td>
</tr>
<tr>
<td>USC.Processor.processor_speed</td>
<td>2400 MHz</td>
<td>400 MHz</td>
<td>3200 MHz</td>
<td>3000 MHz</td>
</tr>
<tr>
<td>USC.Software.software_id</td>
<td>S1, S5, S6</td>
<td>S2, S3, S5, S6</td>
<td>S1, S3, S4</td>
<td>S2, S7</td>
</tr>
<tr>
<td>USC DataBase.database_id</td>
<td>DB1, DB2</td>
<td>-</td>
<td>-</td>
<td>DB2</td>
</tr>
<tr>
<td><strong>Selections Results</strong></td>
<td>T1 and T6</td>
<td>T2 and T5</td>
<td>T3 and T4</td>
<td>T7</td>
</tr>
</tbody>
</table>
Conclusions

- The framework provides a more coordinated and automated form for executing applications in the mobile grid;

- It also allows a flexible, extensible, transparency way to select several shared resources (such as, programs and databases).
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Future Works

- SSL (Secure Socket Layer);
- It submits several other empirical tests the Resource Selector with the objective to analyze its scalability and performance.
Questions !?
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