AGENTCITIES WORKING GROUP PROPOSAL

A Multi-Agent System based on the P2P model to Information Integration

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Keywords
Multi-Agent Systems, FIPA, CORBA, XML, Decentralised/Centralised Peer-to-Peer model, Distributed Case-Based Reasoning model, Data Integration approaches, Workflow Systems, Cooperation Strategies.

Description
Distributed computing often needs to cope with information integration challenges. Up to now, several models have been proposed for information integration in heterogeneous, distributed and (loosely) dynamic environments. Nevertheless, in network environments where actors and their information sources are characterized by high dynamism and non permanent connections, traditional approaches are not adequate. In such a context, we believe that the recent Peer-to-Peer (P2P) distributed computing approach is an ideal solution. Despite several P2P applications/protocols have been realized, they are not able to exchange complex information and to cope with heterogeneity and information integration problems. In particular, for what concerns distributiveness this means to deal also with users that do not own sophisticated (hardware and software) platforms and permanent network connections. Namely, autonomous network users often use simple systems (i.e., personal computers, laptops, wireless devices, etc.) and their network accesses are characterized by variable connectivity.

In this project, we want to extends the capabilities of a Multi-Agent System (JEAP, Java Environment for Agent Platform) in order to realize a new form of distributed and cooperative information system based on the P2P model. In particular, each peer is characterized by his Multi-Agent System (MAS). Moreover, in order to overcome the current data management P2P limitations each MAS owns an high level knowledge representation of the domain that can be dynamically updated by interacting with other MASs. In particular, each MAS must be able to manage and control simple workflows. We consider each workflow composed by a sequence of actions. Therefore, each MAS deals with actions in order to perform data management operations, coordination rules, and cooperation activities over the P2P network. Besides, they have to collect and integrate the actions/results into the schema of their information sources (knowledge updating) in order to better overcome subsequent actions.

Objectives
The main objectives of the Working Group are to:
- Make a survey of the current state of the art in information integration approaches into heterogeneous, distributed and dynamic environments
- Make a survey of the current state of the art in systems based on pure P2P model to share information
- Study and design of a new form of distributed and cooperative information system based on the P2P distributed computing model to information integration
- Improve an existing agent platform (JEAP, Java Environment for Agent Platform) in order to cope with a decentralized P2P environment
- Identify security issues involved in the agent interactions
- Identify a simple case study where testing JEAP (e.g., the Health-care System)
- Provide a Web-site to project description and JEAP accessing
• Disseminate the results of the WG in an appropriate AgentCities meeting (e.g., the Health-care Workshop in Barcelona, February 2003).

Plan of Work

<table>
<thead>
<tr>
<th>Work Plan Stage</th>
<th>Duration (months)</th>
<th>Personnel</th>
</tr>
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<tbody>
<tr>
<td>Improving of the position paper accepted in AAMAS 2002</td>
<td>May 02 – June 02</td>
<td>PA, PE, SP</td>
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<tr>
<td>Survey on information integration approaches in heterogeneous, distributed, and dynamic environment</td>
<td>July 02 – Sep 02</td>
<td>PA, PE, SP</td>
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<tr>
<td>Survey on P2P distributed computing model</td>
<td>Aug 02 – Oct 02</td>
<td>PE</td>
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<tr>
<td>Overview of the MAS based on P2P computing model</td>
<td>Sep 02 – Nov 02</td>
<td>PE, SP</td>
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<tr>
<td>Report on security issues involved in the agent interaction protocols</td>
<td>Sep 02 – Dec 02</td>
<td>TA</td>
</tr>
<tr>
<td>JEAP improvement and some tests</td>
<td>Sep 02 – Mar 03</td>
<td>PE, SP</td>
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<tr>
<td>Dissemination (e.g., Workshop at AgCit.NET)</td>
<td>Feb 03 – Mar 03</td>
<td>All the people</td>
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Output
• An initial position paper outlining the main difficulties and challenges involved in the application of a MAS based on the P2P model to information integration.
• Detailed position papers on each of the objectives in order to be presented at appropriate meetings.
• The WG aims to perform some tests and a demo by its MAS called JEAP.
• Dissemination of outcomes through the AgentCities community and into the WG’s website.

Liaison
• AgentCities Ontology Management Working Group
• AgentCities Security Working Group
• AgentCities Web Services Working Group
• AgentCities FIPA Working Group
• AgentLink II: European network of excellence on agent-based computing (the WG is a member)

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