

Ontology Access Provisioning in Grid Environments

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The increase of use of semantic technologies has reached almost every computer science related field, including the grid computing field. The next generation Grid should virtualise the notion of distribution in computation, storage, and communication over unlimited resources with well defined computational semantics. A Grid node may provide new services, functions or even new concepts that are unknown to clients. The *semantics* of such services are defined by means of Ontologies [Gruber, 1993; Gómez-Pérez et al., 2003]. Thus providing the appropriate means for accessing and using Ontologies in the Grid is fundamental if semantic technologies are to be used. So, the transition from monolithic, centralized ontology services to a virtual organization of Grid compliant and Grid aware ontology services that can coordinate and cooperate with each other is crucial to progress towards the Semantic Grid [De Roure et al., 2005].

In the grid computing area, the current OGSA architecture [OGSA] doesn't consider ontology usage, and there are neither protocols nor standards available in the grid community for tackling with this issue. Therefore the provisioning of proven value mechanisms for accessing and managing ontologies in grid environments is the priority if the grid wants to make profit of the semantic technologies already available in other areas such as the Semantic Web [Berners Lee et al., 2001].

The WS-DAIO specification and the accompanying realizations (WS-DAIO-RDF(S), ...) define the data access services that are needed for dealing with ontologies in grid environments. The specification and the realizations are being developed inside of the OntoGrid project as part of the initiative for bringing together the Semantic Web and the Grid Computing communities in what is being called the Semantic Grid.

WS-DAIO is based on the WS-DAI [WS-DAI] specification, which defines a basic framework for data service interfaces and properties definition. Thus ontologies are made available in grid environments like other specialized data resources, usable across virtual organizations. The WS-DAIO provides a framework for defining ontology access service interfaces using the WS-DAI vocabulary, and extending it with the patterns, properties and behaviors needed for providing ontology access. The ontology data sources are then addressable according to specific WS-DAIO realizations, i.e. WS-DAIO-RDF(S).

WS-DAIO is built over four pillars:

- Unified basic terminology. WS-DAIO defines a neutral vocabulary for naming the ontology elements that are to be used when dealing with ontologies in grid environments. This common and standard vocabulary avoids the usage of multiple different vocabularies that would make difficult the understanding of the provided data elements and functionalities.
- Ontology elements usage patterns. WS-DAIO defines how the messages, methods, interfaces and services must be specified in order to provide functionalities in a standard way.
- Ontology elements possible relationships. WS-DAIO defines how to specify the way each ontology element is related to each other.
- Ontology access services behaviors. WS-DAIO defines which is the expected behavior of the predefined common components and functionalities, so that every concrete implementation must adhere to these behaviors.

By extending WS-DAI, and therefore the OGSA architecture, with WS-DAIO and the accompanying realizations, we provide to the current grid architecture with a standard way for supplying ontology access and management capabilities, thus enabling the future integration of semantic technologies in the grid architecture.

References

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