ONTOGRID

Scope

Defining the architecture that will lead to the emergence Ontogrid is one of the reference projects in the visionary initiative of the Semantic Grid, which aims at combining Grid and Knowledge Technologies. This is done by enriching Grid middleware and applications with semantics, with the aim of allowing business and people to share information, services and computing resources, automating tasks and allowing to rapidly form virtual organisations to solve a specific problem and disband just as easily once a solution is found. By overcoming cross-organisational, cross-industry and cross-country boundaries, and increasing interoperability by making semantic assumptions explicit, the Semantic Grid promises to aid organisations and businesses in any field where input from multiple and potentially highly differentiated actors is required.

Advances

Ontogrid results have reached a sufficient level of maturity and cohesion that allows third parties to rapidly develop metadata-intensive middleware and applications.

On the one hand, Ontogrid has focused on one of the problems of the current Grid platforms and middleware, which is its rigidity: systems aren't easily configurable and there is no way to do things quickly. The project has developed Semantic-OGSA, a reference architecture that represents an evolution of the Open Grid Service Architecture (OGSA) and defines a mechanism for the explicit use of semantics in components and applications.

The Semantic-OGSA architecture has been supported by a set of technological achievements that can be classified in several groups, depending on its target users:

- A flexible and configurable middleware in the form of an open source toolkit, which can be used by application developers that need to make an intensive use of metadata. This toolkit contains services that allow managing metadata and vocabularies, performing negotiations about service level agreements, coordinating resources and understanding the provenance of distributed application execution.
- A small-size testbed that deploys this open source toolkit, for ease of use by higher-level applications.
- A set of Grid middleware applications that demonstrate how metadata can be used and exploited in order to better obtain solutions to common problems in Grid middleware. These applications are more accurate information services, enhanced data access services and security services.
- Two applications in the domains of insurance settlement and satellite image quality analysis, which are described below.

Positioning in global context

The Ontogrid project (http://www.ontogrid.eu/) has developed technological infrastructure to build middleware and applications that describe and exploit metadata from any collection of resources available in a distributed system (a Grid) - computing, storage, data sets, digital libraries, scientific instruments, businesses and people –.

Contribution to standardization and interoperability issues

The Semantic Grid Architecture proposed by Ontogrid is compliant with the most significative Grid standard and well-known bodies. On the other hand, Ontogrid has influenced embrionary, upcoming standards (e.g., the WS-DAI-RDF group at OGF) and has participated in a large number of collaboration, dissemination, and cross-fertilization activities, with other EU-funded and national Grid projects.

Target users / sectors in business and society

From a business perspective, companies using Ontogrid approaches and technology will be more agile in finding solutions to particular problems, especially in sectors where actors are distributed and heterogeneous. To date, adopting Grid systems would entail large upfront costs for companies. Ontogrid has produced Grid technology with the maturity necessary to take down these costs by orders of magnitude. This effort will pay off in terms of increased productivity and lower costs in the long term.

Overall benefits for business and society

The target users of ONTOGRID are financial, e-business organizations and, in general, all kind of organizations with an urge to access data transparently from their location and nature, without losing track of how information is transformed in the process. Additionally, ONTOGRID provides support to create complex, aggregated services which need to virtualize and automatically use a series of resources. ONTOGRID will enable users in business and academia to overcome the complexity, which has been so far inherent to their fields of experience, providing solutions for the specific needs of today's knowledge society.

Examples of use

Ontogrid and the Insurance sector

The European car insurance industry – like many other sectors - faces daily challenges in processing huge amounts of data from different companies, in diverse formats and in different languages. For example, imagine having to resolve an insurance claim for a French man who crashes his car into an Italian truck while on holidays in Germany - this requires many different companies, individual and authorities to come together, share data and reach agreement before a claim can be settled. Today this is inefficient and time-consuming for all parties.

In this sector, the potential benefits for insurance companies – and insurance policy holders - of Ontogrid developments are considerable in terms of reducing processing time, paperwork, misunderstanding and the potential for fraud.

Ontogrid and the Space Sector

Ontogrid has helped space industry reliably and securely collect different large data streams from different organisations transparently from their location, and aggregate them for different purposes. Current satellite operational systems are developed through the use of traditional techniques. Data circulates within the system in the shape of files, with a well-defined structure. Mission Planning for the instruments and for the Satellite operations is issued regularly (background regional mission), nominally on a weekly basis, and can be later modified, before uplink to the satellite. These requests have to be accommodated in the previous valid planning, that can be, therefore, modified several times before it is frozen. A catastrophic event (earth-quakes, volcano eruptions, hurricanes, etc.) or a specific demand from the scientific community are examples of a last minute re-planning. However, sometimes the results obtained are not as expected, and scientists and operational officers need to know why this happened. This is where metadata about resources (instruments, plans) can be used to better understand what happened.

Achievements

Ontogrid portfolio of results include :

- Semantic-OGSA (S-OGSA) reference architecture.
- A Semantic Grid testbed.
- InsuranceGrid and Satellite Image Quality Analysis prototypes.
- Ontology access in Grid applications: WS-DAIOnt-RDF(S) and RGAB.
- Protocols for auction and negotiation.
- P2P Storage and Querying for RDF(S): Atlas
- Knowledge Oriented Provenance Environment: KOPE
- Intelligent Debugging Tools: IDT.
- Annotation of Semantic Grid Services: ODESGS.

title

Ontogrid: paving the way for knowledgeable grid services and systems

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Specific Targeted Research Project

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project website and partner list

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