Semantic Grid Implementation

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The Semantic Grid can be viewed as a combination of Grid technology and Semantic Web technology. It refers to an approach to Grid computing in which Grid resources and services are described or annotated by explicit semantics so that the information resources can be more easily aggregated and consumed by others. The descriptions constitute metadata of ontologies, and are typically represented using the technology of the Semantic Web, such as the RDF (Resource Description Framework) and OWL (Web Ontology Language).

A number of Semantic Grid projects are now in progress and these activities have been reported at many semantic grid events. Typical ones as case studies are illustrated below.

The myGrid [1] is a UK e-Science project led by Carol Goble. In general it is composed of a group of loosely coupled components and services aimed at supporting an in-silico life science research cycle. Life science researchers traditionally need to routinely download data, manually translate in into a required format amenable to specific analytical tools. The myGrid project draws on several semantic web and web service technologies to provide a service-based workflow engine for automating the entire in-silico experimental processes and alleviating the burdensome data and program integration.

CombeChem [2] is also an e-Science project focused on the field of combinatorial chemistry that requires the synthesis of new chemical compounds by mixing large numbers of different compounds. Because of the sheer number of possible combinations, the synthesis large of new chemical knowledge, and demand the integration and corporation of many relevant research institutes.

The CoAKTinG [3] (Collaborative Advanced Knowledge Technologies in the Grid) projects is funded by the UK e-Science Programme. Its main objective is "to advance in a collaborative e-Science working environment through the application of advanced knowledge technologies".

K-WF Grid [4] stands for "Knowledge-based Workflow for Grid". It is also one of the European grid projects with the objective of addressing the need for a knowledge-based workflow infrastructure for the future Grid environment. Basically, it assists its users in composing powerful Grid workflows by means of a rule-based expert system, and enables the configuration of a complex semantic-based Grid execution environment.

China has been very active in semantic grid research since the birth of the Semantic Grid. Noticeably, a national research team was formed in 2003. The five-year semantic grid initiative [5] funded by China Ministry of Science and Technology, about $3.1M in total, constitutes various subjects.

The Semantic Grid poses many challenging issues including data integration, service management, knowledge discovery, trust computing, distributed problem-solving. It is stated that the semantic grid, as a combination of the technologies from both grid computing and the semantic web, would provide a promising alternative for developing a future interconnected environment, particularly geared to enabling highly selective resource sharing, sensible knowledge discovery and collective intelligence.

1. myGrid: http://www.mygrid.org.uk/
2. http://www.combechem.org/
3. http://www.aktors.org/coakting
4. http://www.kwfgrid.eu
5. China Semantic Grid initiative: http://www.semgrid.net/eng_pro_int.htm