IST Conference 2004

Networking session

***"The Semantic Grid: when the
Semantic Web meets Grid"***

15/11/2004
Frans Hals Hall, The Hague

<u>Final Report</u>

Context:
The convergence of Grid and Web services and the combination of semantics with Web services has led to the powerful concept of the Semantic Grid. This is now becoming the driving force for the design of the next-generation of Grid architecture. This networking session offered an opportunity for both the Semantic Web and Semantic Grid communities to become better acquainted with the latest progress in the other community and to identify synergies between the two fields of research. It aimed to stimulate discussions about opportunities for future collaborations between two areas of research that, until now, have been parallel but separate.

The Networking session took place at the IST 2004 event in the Hague and in terms of topics it was classified by the organisers as being relevant to 2 topics: "Advanced Grid technologies and systems and services" and "Semantic-based knowledge systems".

Session Objectives:
- Identify complementary issues, potential cooperation topics:
- Discuss scientific and technical topics such as architectures, coherent stacks of standards, etc.
- Encourage communications and contacts between the (several) relevant communities
- Establish workable approach and strategy for the short, medium and longer term
- Include project-based collaborations already in FP6, even closer synergies in FP7
- Ensure faster progress, better results, greater impact

Attendance:
Just over 100 people participated in the session. Both communities were equally represented among the participants.

Presentations – Commission:
Following an introduction and presentation of the session Agenda by Eoghan O'Neill, European Commission, DG INFSO-F2, (Coordinator of the networking session), a brief overview of future IST activities (WP2005-6 Calls) in the Semantic Web and Grid Technologies domains was presented by the Chair, Vincent Obozinski (European Commission, DG INFSO F2). His presentation also covered the respective Missions and Strategic Objectives of two units of DG information Society: Unit E2 ("Knowledge Management and Content creation", responsible for monitoring IST funded projects in the area of Semantic Web[*]) and Unit F2 ("Grid Technologies", responsible for monitoring IST funded projects in the area of Semantic Grid). V. Obozinski's presentation concluded by listing the expected benefits of the session, namely:

- Increased clarity of scope and content
- Better understanding of areas for fruitful overlap
- Improved visibility of key actors
- Cross-fertilisation between different constituencies
- Mutual positioning and better targeting of future FP6 proposals
- Building bridges between communities for FP7

Presentations – Invited speakers:
Speaker from the Semantic Web community: Dieter Fensel, DERI Institute, Galway, Ireland

D. Fensel's presentation entitled "The Semantic Web – Capitalising on growing Semantic Web expertise" provided an overview of Semantic Web technologies including the latest research developments and standards-making activities in the domain. He concluded by identifying a number of key issues for integration of

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[*] Brian Macklin of Unit E2 was due to deliver this part of the presentation as co-Chair, however he was not present at the beginning of the session due to an unanticipated travel delay

technologies and policies in the two domains such as ensuring compatibility of the Semantic Grid and the Semantic Web rather than making them alternatives to each other and the necessity to build/develop compatible languages/standards and architectures for services accessed via the Grid or via the Web. In concluding he identified that the key thing the Semantic Web community can bring to the Grid is Semantics - leading to automated discovery, selection, composition of semantic Web services etc as well as 'solving' the integration problems.

Speaker from the Semantic Grid community: David De Roure, University of Southampton, UK

D. De Roure's presentation entitled "The Semantic Grid - Grids leveraging Semantic Web technologies" provided an overview of the Semantic Grid vision including the latest research developments and Global Grid Forum activities in the domain. The Semantic Web and Semantic Grid initiatives were compared and contrasted in the presentation. He highlighted the heterogeneity of distributed computation resources and the interoperability of multi-organisational federations of distributed services as key issues to be resolved by the Semantic Grid.   The talk was concluded by identifying a number of short and medium term opportunities for community collaboration and by underlining how much both Semantic Web and Semantic Grid share a vision of "joining things up". Achieving this vision will be greatly facilitated by bridging the two research agendas in the long run.

Discussion:
An in-depth discussion with questions and comments from several members of the audience followed the two talks. A selection of the key points raised in the discussion is presented below.

Michael Wilson (W3C UK Office Manager) observed that speed and scalability are required by users but that semantic processing and use of RDF reduce speed and hamper scalability. His view was that this will possibly result in some users using cheaper, easier and faster methods and, consequently, only sharing ontologies when possible or feasible. Would it be practically possible - he asked - to have mechanisms to negotiate between different ontologies? In response D. de Roure took the opportunity to clarify that he was not proposing "one global ontology", and that he was agreeing nonetheless with most of M. Wilson's observations. While semantics - he stated - are perceived as "overhead" to the Grid community, and XML - he suspected - would be a solution for the Grid community, he noted that RDF was however reacted to positively by the Grid community. John Domingue (Knowledge Media Institute, The Open University, UK) said that one should not regard ontologies as part of the problem but as part of the solution. Different communities will by their very nature have differing points of view. Ontologies are a device which allow us to formally capture these points of view explicitly. Once captured we are then able to discuss and compare the viewpoints (both formally and informally).

Gary Randall (British Maritime Technology, United Kingdom) wondered when the Semantic Grid would become a reality for the average citizen as opposed to the large e-Science institutions. D. De Roure mentioned the case of a FP5 Grid project where attempts to build realistic use cases and business models for trading services on the Grid were made. He quoted an estimate of 3 years to come before demonstrators would be available. He pointed out nevertheless the chasm to be crossed between an ordinary researcher and the layman in the street. D. Fensel continued by stating that goal-oriented description particularly in conjunction with resource allocation is out of reach of the "normal user's capability" and that automated reasoning using inference engines on the fly would not be feasible. He advocated the use of "predefined/precompiled task definition" as a way to circumvent both the logic difficulty for human beings and the scalability problem for computers.

A. Emmen (EntertheGrid, Primeur) asked how metadata for instance on top of MPEG7 standard and topic maps belonging to ISO (and not to W3C) fit in the Semantic Web and Semantic Grid RDF-based standardisation picture? D. Fensel said that a lot of care had been taken in the beginning to have a match between RDF based descriptions and topic maps. Web services specifications are also coming from other industry-led standards bodies such as OASIS. There are efforts on-going to align European WSMO definitions with American OWL-S proposals. There is no point in being dogmatic here about the best standard route. D. De Roure agreed with D. Fensel's statement adding that there are a lot of data generated by e-Science that are streamed and that what really matters is making explicit the knowledge and properly representing it.

A. Tirado (University of Amsterdam, NL) asked D. De Roure for the status of semantics in Globus Toolkit 4. While stressing the importance of resource description, D. De Roure in his reply confirmed that plans are in place – in the context of the Semantic Grid research Group in the Globus Grid Forum – to investigate descriptions (based on OWL) for the various standard definitions of "resource" used in the Grid world. His estimate was that it will take approximately 1 year for a working group to produce the required results.

A. Tirado (University of Amsterdam, NL) also raised the question with D. Fensel about possible "killer applications" of the Semantic Web with service composition being suggested as one potential enabler for such a "killer app". In his response D. Fensel took the opportunity to clarify that he does not consider Semantic Web services as a killer application of the Semantic Web but Semantic Web services (WS) are the "next step" beyond

the Semantic Web as the latter is about describing semantics of data whereas the former are about describing semantics of processes or services. His view was that, for it to be successful, the Semantic Web must have many other applications before Semantic Web Services materialise.

Peter Krauth (KFKI Computer Systems Corp., H) asked what was the role of data cleaning in the Semantic Web. *Richard Benjamin from Intelligent Software Components* reinforced this question by insisting on the character of raw and even wrong information to be found in the Web. D. Fensel replied that this was a critical issue and a very interesting research item. Tools for establishing trust, reliability and prioritisation (ranking) of data can offer simple centralised solutions in the case of company intranets with a lot of information redundancy and inconsistency and hence provide some initial business opportunities for the Semantic Web.

Marc Alcantara (Azure Solutions, a UK-based spin-off of British Telecom) asked the invited speakers if there was room for business models in the Semantic Grid. D. De Roure responded by saying that the Grid should be looked upon as an "extended-enterprise" infrastructure and that furthermore plans are in place for number of operational functions such as charging, SLA, etc. which are part of business models to be candidate for semantic representations for automated processing. The timescale for achieving this is within 3 years. D. Fensel confirmed that from his point of view there is definitely place for inter-enterprise business process management in the Semantic Web.

Colin Upstill of IT Innovation (UK) posed the question: does the Semantic Grid pose security and privacy issues or does it help security and privacy? D. De Roure expressed the view that the Semantic Grid provides research challenges and opportunities in terms of security and privacy, putting the question: what is the best practice to deal with the privacy of resources metadata versus handling the privacy of the data resources? He also noted that Semantic Web technologies enabled facts to be inferred which were otherwise not explicit, which also has implications on privacy.

Contributions:
There were 2 contributions by participants submitted prior to the event. These were briefly presented to the audience after the discussion and before the conclusions. An abstract of each contribution is provided below:

Contribution 1: "Business Intelligence through Grid-enabled Semantic Integration"
Peter KRAUTH (KFKI Computer Systems Corp., Hungary)

The Grid-technology enables extremely large and complex data analysis typical in business intelligence applications. For this purpose, uniformity of data access, description and semantics independent from the technical environment, are required primarily. Instead of virtual computers, the Semantic Grid should allow for high capacity, virtual databases to be dynamically created from Grid-based data sources. A so-called Model Warehouse approach is proposed for semantic information integration to reduce development resources and increase flexibility in building Grid-based virtual databases. Key techniques: ontology management based on description logics, algebra based model management, algorithms for ontology comparison and verification, automated data cleaning methods, and methods for extracting ontology fragments.

Contribution 2: "Knowledge Distillery: An integrated framework for producing semantically-unified knowledge"
Andreas SYMEONIDIS (Aristotle University of Thessaloniki, Greece)

The proposed project aims to develop an open, scalable framework to enable the semantic integration of heterogeneous information resources and to enhance knowledge sharing between services and applications in the Semantic Grid. Knowledge Distillery will undertake the tasks of: a) acquiring and processing various types of data and knowledge from repositories scattered throughout the application Grid, b) organizing it in a unified manner, in order to produce a semantically-aware knowledge model, taking into account process evolution and cross-linguistic issues and, c) updating it dynamically upon modification of lower-level information. The main aim of Knowledge Distillery is to provide developers with useful, dynamic views of the produced Unified Knowledge Model, in order to embed it into their applications in a seamless fashion.

Conclusions:
In concluding the session D. De Roure, invited speaker of the Semantic Grid community, underlined that both the Grid and Semantic Web present significant challenges that have an enormous potential to mutually benefit from collaboration. D. Fensel also agreed that both communities should join forces. Fensel and De Roure announced that they had agreed to hold a follow-up meeting in early 2005 to map a way forward in the long run. In the nearer future two events where the two communities could jointly collaborate on short to medium term issues were identified: the European Semantic Web Conference (taking place in Crete in May 2005 http://www.eswc2005.org) and the Dagstuhl Seminar on "Semantic Grid : The convergence of Technologies" (taking place in Germany in July 2005 http://www.dagstuhl.de/05271/). These conclusions were fully endorsed by Units E2 and F2 of the European Commission DG Information Society. Unit F2 also announced a Call 5 preparatory workshop with a Semantic Grid session to be held on January 31 - February 1, 2005 (see http://www.cordis.lu/ist/grids/call5_prep_ws.htm for more information on the workshop).