BREIN

Scope

The Grid adoption inside business environments has not experienced the same uptake as anticipated with respect to the experience in science and academic institutions. Nowadays, only some industrial sectors such as aerospace, automotive or pharmaceuticals are using Grid concepts in a business context, since they are requiring high and clear computation capacities. In fact, most enterprises lack of interest in Grid capacities since it implies high knowledge and resources and companies are requiring more high level and complex services.
Thus, Brein arises in order to address these problems by the introduction of Software as a Service model and by supporting collaborations among enterprises in a dynamic and flexible way. The Brein project aims to develop a framework, which will extend the Grid possibilities by driving their usage inside new target areas in the business domain. In this matter, Brein is dealing with providing all necessary basics these new business models need: enterprises' system interoperability, flexible relationships, dynamicity in business processes, security mechanisms and enhanced SLA and contract Management.

Advances

Brein goes beyond the state of the art techniques, since there is not any commercial product which tries overcomes the dynamic enterprises collaboration necessity in an automatic way. Thus, the project aims to develop a framework, with all the necessary functionalities in a business Grid, so as to enable its enterprises to be introduced into the SaaS model and thus simplifying their relationships complexity.
The Brein framework will allow:

- SMEs to be part of value systems in business models since they can afford/reduce costs.
- SMEs to be able to offer their resources as a services, avoiding high investment costs
- Enterprises to expand their services by adding third party services

On the other hand, with respect to the state of the art, Brein will combine the flexibility and stability of Grid-technologies with the autonomy of Multi Agent concepts and enhance it with the intelligence and adaptability of AI systems. It will furthermore make extensive use of semantic web's knowledge management capabilities and embed security technologies into these approaches.

Positioning in global context

Brein is aware of the introduction of Grid technology inside business environments in terms of solving all the current enterprises relationships problems expanding the Grid potential by integrating Agent and Semantic Web technology. The Brein results will focus on the needs from business to enhance existing Grid technologies to allow especially SMEs to participate in value systems which were not accessible for them so far.

Moreover, Brein will enable service providers to reduce costs whilst maximizing profit. The framework will automatically adapt to changes in individual business needs and/or environment in an intelligent manner. Cost and effort for service provisioning will be greatly reduced by simplifying business goal definition, intelligent optimization and decision making support.

Contribution to standardization and interoperability issues

Brein contributes in the specialized standardization working group of the Agent Web Service Interface Working Group (FIPA AWSIG), while at the same time Brein efforts on development of semantic model of the Grid can be provided as input for standardization of information models within OGF. In addition, the Grid Resource Allocation Agreement Group (GRAAP-WG) is constantly fed with the experiences and outcomes of BREIN´s work in the area of Service Level Agreements.
It is also planned to contribute to two groups dealing with workflow technologies in OGF, the OGSA Workflow and the Workflow Management RG, with the experience made for the Semantic Workflow Management Framework in Brein.

Target users / sectors in business and society

The Brein outcomes are focusing mainly on enterprises of any kind of industrial sectors. Any SME will be able to deploy their service without requirement infrastructure. In addition, large enterprises can create most complex business processes by being able to outsource selected tasks.
Finally, a third entity (for instance an operator) will be able to offer this framework as a platform participating as a medium entity among services providers and clients. In this matter, companies can assume roles in the value systems as Brein infrastructure provider, software vendors, service providers of different kinds of services, etc.

Overall benefits for business and society

Brein will realize the flexible, intelligent Virtual Organization support to significantly reduce the complexity of modern day business-to-business collaborations. Companies and enterprises of any size are able to compete equally in a complex and demanding market. The Brein framework will allow customers to exploit collaboration benefits even if they have only little expertise. At the same time, companies are enabled to provide their services with little effort as the definition of requirements and goals will be simple. With its support for intelligent decision making, the individual business needs of the in-

volved parties will be pursued and fulfilled to a high degree. The integrated ability for automated adaptation to changes in business needs and environment, as well as the stable and intelligent self-management, will enable the service providers to minimize their costs while on the other side maximizing the profit.
Finally, Brein will deal with reducing complexity in business, since it will overcome manual tasks in an automatic way. In this matter, important decrease in terms of effort and time are carried out in the creation and maintenance of processes. Furthermore, the time to market to launch a new product into market is reduced due to reducing manual tasks.

Examples of use

The project has a strong influence of business requirements established by the definition of two scenarios (the Virtual Engineering and the Airport scenarios) driven by their stakeholders in the project: ANSYS Europe Ltd and the Stuttgart Airport.
ANSYS deals with complex distributed computational tasks are currently only possible with heavy resources usage, which is always bound to high costs. Thanks to the Brein platform, end users will have the possibility to exploit the advantages of distributed computing. Moreover, teams of engineers will be enabled to collaborate remotely in design processes in a Virtual Engineering VO to benefit from: decreased costs, usage of flexible workflows, controlled accesses and optimal resource usage.
Regarding airport scenario, it tries to solve problems of managing connections of different airlines between different locations is a complicated task and raises often enough a lot of problems (e.g. passengers get stuck) for both passengers and airports at the same time. The Brein framework will allow airports to act as Virtual Hubs in the world market that can shift passengers to optimize their travel plan, getting improved planning of transfers, advanced usage of resources, high competitiveness of airports and decreased costs for passengers, airports and airlines.

Achievements

One of the major achievements of Brein so far is an initial version of a Grid Reference Architecture with semantic and agent capabilities. The first step had been to merge and consolidate concepts originating from several Web Services oriented projects such as TrustCoM, NextGrid, Akogrimo and Ontogrid and in a second step to amend these solutions in selected areas with agent and semantic capabilities. This initial architecture has been evaluated in the context of a scenario covering logistic processes at an airport and utility computing in virtual engineering. Implementation of the underlying infrastructure components and scenario specific components are realised in an initial release and scheduled for demonstration in November 2008.
Beside the technical achievements mentioned above the project has delivered a business process model framework identifying the relevant actors and their roles in a business grid network.

Result	Maturity	Contact Points
Brein Grid Reference Architecture	First Release	Giuseppe Laria, laria@crmpa.unisa.it Lutz Schubert schubert@hlrs.de
Airport Scenario	Alpha Releases	Anna Sfairopoulou
Virtual Engineering Scenario	Alpha Releases	anna.sfairopoulou@upf.edu
Business Grid Process Model Framework	Released	Prof. Stefan Kirn stefan.kirn@uni-hohenheim.de
Brein Business Whitepaper	First Release	Henar Muñoz henar@tid.es
All other publications	-	Anna Sfairopoulou anna.sfairopoulou@upf.edu

BREIN
Business objective driven REliable and Intelligent grids for real busiNess

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