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GridCOMP project results: Composing distributed code and services for Scale and Speed

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GridCOMP, Grid Programming with COMPonents, to stand out as an Advanced Component platform for an Effective Invisible Grid.

GridCOMP is a Specific Targeted Research Project on Grid programming with components, partially funded by the European Commission in the sixth Framework Programme (FP6) from June 2006 to February 2009.

According to Denis Caromel, INRIA, Scientific Coordinator, *"The main goal of the project was the design and implementation of a component based framework suitable to support the development of efficient grid applications. The produced framework implements the "invisible grid" concept: abstract away grid related implementation details (hardware, OS, authorization and security, load, failure, etc.) that usually require high programming efforts to be dealt with. Therefore, GridCOMP makes it possible to seamlessly compose applications and services deployed on small to large scale infrastructures."*

Patricia Ho-Hune, ERCIM, Administrative Coordinator of the project, adds: *"GridCOMP has forged strong collaborations between academic and industrial partners, thus producing sustainable results which are exploited beyond the project lifetime."*

Sustainable results through the GCM standards

To facilitate industry take up of the results, the GCM (Grid Component Model) specifications have been or are in the process of being accepted as standards by the European Telecommunications Standards Institute (ETSI). IBM and Atos Origin, both partners in this project, intend to build on the GridCOMP results. GridSystems, INRIA (the French national institute for research in computer science and control), and its spin-off company ActiveEon already work on the integration and further development of the GridCOMP framework.

A comprehensive framework simplifying parallelization and distribution

The core technology provided by GridCOMP is the reference implementation of the GCM originally defined in CoreGRID – a Network of Excellence also managed by ERCIM (the European Research Consortium for Informatics and Mathematics). The developed prototype takes the ProActive Parallel Suite (http://proactive.inria.fr) as the starting point to feature a component framework allowing management of remote components supporting collective communications. It also includes a deployment framework providing interoperability with several grid schedulers and middlewares.

The GCM also provides non-functional concerns by means of a prototype of behavioural skeletons modelling common parallelism exploitation patterns and implementing an autonomic manager taking care of ensuring user supplied performance contracts. The behavioural skeletons implement embarrassingly parallel, parameter sweeping, master/worker as well as several kinds of data parallel patterns. They have already been demonstrated to be able to take care of non functional concerns, including fault tolerance and security issues.

The GCM implementation targets all software architects in need of a comprehensive framework to express at design time the parallelisms and distribution of an application. Furthermore, developers do not need to spend extensive time to learn distribute programming or implement collective communication, but rather concentrate on the business code and leverage the GCM framework.

Easier development thanks to the GIDE tool

A specific tool, the Grid Integrated Development Environment (GIDE), has been developed to take advantage of the new component-oriented development methodology created in GridCOMP. The GIDE, which is tightly integrated with Eclipse software framework, was designed to empower the end user with all the tools necessary to compose, deploy, monitor, and steer Grid applications. Thus, this tool reduces software development cycle, increases portability, and provides support for dynamic properties in the generic component-based Grid system built on top of the ProActive Grid middleware.

Several use cases, exploited by Industrials, available to start with GCM

According to Toni Arbona, GridSystems, in charge of Use Cases *"To promote the capabilities of the GridCOMP framework, four industrial use cases have been developed. They represent a jump start for people new to GCM and are thus vital for the future success of the framework. Industrial partners make use of their respective use cases to highlight the benefits of GridCOMP, both internally and to their customers. Use cases include Extended Data Record processing, Wing design, Biometric Identification for Security, and Days Sales Outstanding for company invoice".*

On the way to the SOA World

As a perspective, it is planed to integrate GCM components into Service Component Architecture (SCA) through web service bindings. Therefore, GCM components will be the building blocks for integrated SOA (Service-Oriented Architecture) towards SLA (Service Level Agreement) and QoS (Quality of Service).

http://gridcomp.ercim.org/