

Charter for the

Grid Scheduling Architecture Research Group

Area SRM - Scheduling and Resource Management

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Webpage:

The webpage for the RG is available at:

<http://ds.e-technik.uni-dortmund.de/~yahya/ggf-sched/WG/arch-rg.html>

Mailing List:

The mailing list for the RG is: gsa-rg@gridforum.org

Information for joining the mailing list is available on the webpage above.

Charter:

The goal of this research group is to define a scheduling architecture that supports cooperation between different scheduling instances for arbitrary Grid resources. Considered resources include network, software, data, storage and processing units. The research group will particularly address the interaction between resource management and data management. Co-allocation and the reservation of resources are key aspects of the new scheduling architecture, which will also include the integration of user or provider defined scheduling policies.

The group will begin with identifying a set of relevant use-cases based on experiences obtained by existing Grid projects. Then, it will determine the required components of a modular scheduling architecture and their interactions.

Services and protocols from other GGF groups are considered as potential basic building blocks of such an architecture and will be used wherever possible.

Background:

Grids will provide a large variety of complex services. The interactions of those services require an extensible and integrated resource management. Although such a coordinated scheduling of services is currently not available. It is envisioned as essential for most applications; see for instance "The Anatomy of the Grid" by I. Foster, C. Kesselman, S. Tuecke. Almost all but the simplest Grid applications need the coordination of several resources. Instead, they require a different approach to scheduling than presently used in distributed systems. This approach must take into account that resources in a Grid typically do not belong to the same administrative domain. Therefore, the individual demands of the participants need to be observed. This requires a new technological approach.

Access to resources is typically subject to individual access, accounting, priority, and security policies of the resource owners. Those policies are typically enforced by local management systems. Therefore, an architecture that supports the interaction of independent local management systems with higher-level scheduling services is an important component for Grids. Further, user of a Grid may also establish individual scheduling objectives. Future Grid scheduling and resource management systems must consider those constraints in the scheduling process. Taking into account different policies is also important for the implementation of various economic and business models.

The current GGF standardization effort comprises several services that contributes to a coordinated Grid scheduling architecture. For example, OGSA and OGSF deliver a technological foundation for Grid services. In addition, there are several working groups actively working on important subtopics in the area of resource management and scheduling, e.g. GRAAP, GESA, GPA, DRMAA or JSDL. They address negotiation, reservation, description and allocation services. Specifically, the GRAAP WG addresses questions on negotiation (WS-Agreement) and reservation. In addition, GESA develops the core service for economic services. However, a general view on the resulting architecture for multi-level Grid scheduling is missing. It is the task of the research group to discuss and draft a Grid scheduling architecture that can be built using these services. It is necessary to clarify the interaction to existing services and to identify missing but necessary components. As a first step we determine the requirements of distributed higher-level Grid scheduling. This requires a community-based approach to gain information on the different views on Grid scheduling. If possible, consensus and/or competing alternatives will be identified and published.

Note, that it is not the task of the Research Group to define protocols or algorithms. Instead, the RG identifies the requirements for Grid scheduling, designs a suitable Grid scheduling architecture including existing services as well as currently missing components and their interaction. It is expected that this research group will eventually spawn new working groups.

Previous work:

An initial BOF was held at GGF5 in Edinburgh to gauge interest in the topic of a Grid scheduling architecture. After positive feedback, the creation of a research group was instigated.

A second BOF was conducted at GGF6 in Chicago at which the first draft of the charter was presented and discussed.

A workshop on the Grid scheduling architecture was held at GGF7 in Tokyo to bring together people from different Grid projects with scheduling activities.

Presentation slides and additional information can be found on the research group webpage.

Milestones:

In contrast to a working group, a research group is designed for long term examination of relevant and important Grid related topics. Therefore, only tentative milestones for the near future (12-18 months) are given:

Document on "Requirements of Coordinated Grid Scheduling":

- GGF10: Discussion on relevant and typical use-cases of Grid scheduling
- GGF11: Delivery of a first draft on requirements. First presentation and community discussion.
- GGF12: Presentation of a revised document for public comment.
- GGF13: Producing final document version and submission to GGF editors.

Document on "Architecture of Grid Scheduling"

- GGF10: Discussion on the interaction of existing and currently underdevelopment services; collection of the different views on the architecture that is created by these services and the anticipated architecture.
- GGF11: Presentation of a first draft according the different inputs. General discussion on potential design alternatives. Identification of aspects with consensus as well as competing or conflicting views.
- GGF12: Presentation of a refined general architecture draft. Discussion on identifying the most relevant components. Tight cooperation with the different WGs on the available and projected functionalities of their WG subjects.
- GGF13: Presentation of an extended document including a more concise outline of the individual components. Discussion on the interaction of the components. That is, resulting from the "requirement document" the architecture and the included services must be checked whether the requirements are met or additional functionalities to existing or new services are necessary.
- It is expected that the Grid scheduling architecture will be constantly revised and during following GGF meetings.

Resulting from the discussion on the requirements for Grid scheduling and the relevant use-cases, it is expected that additional topics arise that contribute to a Grid

scheduling architecture. According to previous and current discussions, typical aspects are the inclusion of job workflows, different policy rules (e.g. security, access, accounting) as part of scheduling policies.

The research group will serve as a forum for discussion and coordination of different aspects of a Grid scheduling architecture.