



Open Science Grid

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OSG document #	

Change History

8/31/2006	Gabriele Garzoglio	Started the document from the input from the OSG Consortium Meeting
9/07/2006	Gabriele Garzoglio	Gathered feedback from tg-mig list

About this document

The GLUE Schema v1.2 is an information model extensively used in the Open Science Grid (OSG). This document proposes a set of extensions to the GLUE Schema v1.2 and contributes to the definition of the version 1.3 of the Schema. The extensions are derived from real use cases observed by Open Science Grid Virtual Organizations.

1. Introduction

Several groups of representatives from the OSG, TeraGrid, EGEE, NorduGrid, and other relevant stakeholders have started collaborating to draft a document to define the GLUE Schema v1.3. The plan is for these groups to come up with their requirements by the beginning of September 2006 and to accomplish the document by November 15, 2006. Several representatives of participating groups have agreed upon this plan.

This document is the first OSG contribution to this process. The document proposes a set of extensions to the GLUE Schema v1.2 [1]. Each extension addresses use cases faced by VOs on the Open Science Grid infrastructure.

The extensions are organized in three categories: “Schema Extensions”, “Attribute Values Definitions”, “Implementation”. Topics in “Schema Extensions” propose additional attributes to the current schema. Topics in “Attribute Values Definition” propose a more stringent definition for the values for certain attributes already in the schema. Topics in “Implementation” are related to the mapping of the GLUE Schema to LDIF format.

2. Extension

This section describes the proposed OSG extensions to the GLUE Schema v1.2.

VOView Entity Extensions

Schema Extension

In the GLUE Schema v1.2, the VOView entity provides a mechanism to describe different viewpoints related to local policies on the resources assigned to a queue (CE). The VOView entity includes attributes such as “RunningJobs”, “FreeJobSlots”, “DefaultSe”, etc. In the schema, VOView does not contain any of the attributes that define CE policies, such as “MaxWallClockTime”, “MaxTotalJobs”, “Priority”, etc. In other words, the current schema does not allow the overriding of the CE-level policies through the VOView entity or any other mechanism.

In OSG, USCMS has presented a use case where the ability to specify VOView-level policy is necessary. At the CMS Tier-2 center clusters, jobs submitted by the group /cms/prod does not incur in any wall clock time limitation. Users that do not belong to the group, typically incur in such policy limitations.

The schema allows the definition of a “MaxWallClockTime” for the CE. Yet, even if the CE characteristics associated with the /cms/prod group are described through the VOView entity, the schema does not provide a mechanism to override the CE-level value of “MaxWallClockTime” for this specific group.

We propose to include all attributes defined in the CE-Policy entity in the VOView entity.

Addition of the QueueView Entity

Schema Extension

The current VOView entity in Glue Schema 1.2 contains attributes such as "MaxTotalJobs" and "FreeJobSlots". We propose to add a new entity named "QueueView" inside VOView. This will be an optional entity with a one-to-many relationship between VOView and QueueView. The goal of this entity is to provide more accurate information to resource selection/brokering services.

In the Open Science Grid, the value of FreeJobSlots being published is the sum of all the job slots that are available to that VO. Let us consider a use-case from the perspective of a resource selection service. VO X has 10 jobs that require a wall clock time of 2 days and another 10 jobs that require a wall clock time of 1 hr. Also let us say there is a computing element (CE) that accepts jobs from VO X, and allows submission to two

queues; queue 1 has 1 free job slot and has a maximum wall clock time of 3 days while queue 2 has 15 job slots with a maximum wall clock time of 1 hour.

Currently, information services adopting the Glue Schema 1.2, publish either

1. FreeJobSlots: 1 ; MaxWallClockTime: 3 days
2. FreeJobSlots: 15 ; MaxWallClockTime: 1 hr
3. or some combinations thereof

None of the combinations will provide correct information in all cases. So the information published does not convey the correct/complete state of the CE. However, queue-specific information will help resource selection services make an informed decision. For our example, with queue-specific information, a resource selection service may decide to send the jobs with the shorter wall clock time requirement to this CE and hunt for another CE that can service longer jobs.

We recommend that the following attributes that are already/plan to be included in VOView also be included in the proposed QueueView entity.

1. LocalID: String
2. RunningJobs: int32
3. WaitingJobs: int32
4. TotalJobs: int32
5. FreeJobSlots: int32
6. MaxWallClockTime: int32
7. MaxCPUTime: int32
8. MaxRunningJobs: int32
9. MaxTotalJobs: int32
10. Priority: int32
11. AssignedJobSlots: int 32
12. EstimatedResponseTime: int 32
13. WorstResponseTime: int32

CEPolicyMaxWallClockTime Definition

Attribute Values Definitions

The GLUE Schema v1.2 allows the definition of the maximum wall clock time for a CE through the policy attribute “MaxWallClockTime”. The definition of such attribute is:

“The maximum amount of wall clock time allowed to each job by the execution environment. Once this time is expired the job will most likely be killed or removed from the queue”

DZero has reported problems in the selection of computing resources using the “MaxWallClockTime” attribute. Some sites use the attribute to publish a value that can

sometimes be overridden upon request; other sites impose a strict limit. The definition is not strict enough to eliminate this ambiguity.

We propose to mandate that the “MaxWallClockTime” parameter be a strict limit and to recommend that the applications always declare parameters such as “MaxWallClockTime” to the job management system e.g. via the job description. We believe that the expectation should be that a wall clock time can be granted to the application upon request IF it is less than the published “MaxWallClockTime”. If no limit is enforced by the local job management system, we propose to use the value $2^{32} - 1 = 4294967295$ minutes, since the value of “MaxWallClockTime” is of type int32.

CEInfoContactString Definition

Attribute Values Definitions

The CEInfoContactString attribute defines a contact address for submitting jobs to a computing element. Its definition is

String specifying how to contact the service. A default value can be HostName:GatekeeperPort/Jobmanager. It identifies an endpoint for computing resources in a given protocol (usually GRAM)

This definition is ambiguous, as the schema does not mandate the specification of a protocol for this value. In addition, the recommendation of using a GRAM URL endpoint by default is seldom considered. In the current implementation of the Generic Information Providers, in fact, this value is not an end point for the GRAM protocol, since, for every CE, it is the concatenation of the GRAM URL with the queue name of the local batch system. This syntax cannot be directly used in commonly used grid scheduling and job submission tools, such as Condor-G or globus-job-run, unless external string manipulations are applied.

We propose that the contact string includes the protocol name, IF it is not an end point for the GRAM protocol. This change may affect the implementation of resource selections and scheduling systems, such as the LCG Resource Broker.

CEAccessControlPolicyBaseRule Definition

Attribute Values Definitions

The AccessControlBaseRule attributes are used to represent or discover the authentication and authorization policies of a CE. The GLUE Schema document v1.2 recommends using the syntax of VOMS Fully Qualified Attributes Names for the values of this attribute. The advantages of such approach are described in the Glue Schema v1.2 document [1].

We propose to deprecate any other syntax for the value of `AccessControlBaseRule` in the GLUE Schema v1.3. This change may have implications on the interoperability of the Information System across Grids.

SE to CE Binding

Implementation

The GLUE Schema specifies a many to many relationship between CE and SE. However, the current mapping of the schema to LDIF format links CE to SE elements, but not vice versa. In other words, having a list of SE containing files of interest, there is no programmatic way of finding what CE can directly access such files.

We propose to work on a new version of the GLUE Schema to LDIF format document in order to include SE to CE binding information.

3. Conclusions

This document proposes a set of extensions to the GLUE Schema v1.2. It is the first OSG contribution to the definition of the GLUE Schema v1.3.

References

- [1] GLUE Schema Specification version 1.2:
http://glueschema.forge.cnaif.infn.it/uploads/Spec/GLUEInfoModel_1_2_final.pdf