

Design of Gluon: an Atom-oriented approach for publishing GLUE 2.0 information



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The GLUE 2.0 specification is an OGF specification for standard-based Grid resource characterization to support functionalities such as discovery, selection and monitoring. An XML Schema realization of GLUE 2.0 is available, nevertheless, Grids still lack a standard information service interface. Therefore, there is no uniform agreed solution to expose resource descriptions. On the other side, the Atom Syndication Format (ASF) and the Atom Publishing Protocol (AtomPub) are Web standards which enable the publishing and editing of Web resources using RESTful HTTP and XML. These standards are successfully adopted to provide access and manipulation to a large variety of information in the Web. For instance the Google GDATA API, which is based on AtomPub, offers access to most of the Google services. In this paper, we propose to leverage these standards in order to represent GLUE 2.0 information using ASF, and to publish them via AtomPub. By this approach, we provide a uniform approach that could be adopted by all Grid services to expose GLUE-based information in a common manner. In this study, we consider also extensibility aspects to support the inclusion of extra information not captured by the GLUE specification. The security aspects are out of scope in this phase.

The Atom Publishing Protocol

The Atom Publishing Protocol (IETF RFC 5023) is an application-level protocol for publishing and editing Web resources. It is based on the HTTP protocol and Atom-formatted representations

Key Concepts

- **Collection** A Resource which contains a set of Member Resources
- **Member Resource** A Resource whose URI is listed in a Collection. Member resources can be Entry Resources (that is, Atom Entry documents) or Media Resources (anything else).
- **Workspace** A named group of Collections
- **Service Document** A document that describes the location and capabilities of one or more Collections, grouped into Workspaces.
- **Category Document** A document that describes the categories allowed in a Collection.

GLUE

An important aspect to realize the discoverability of resources is sharing a common characterization of what the resources are, their properties and relationships. This information is made available via a Grid information service and is therefore accessible by potential consumers.

The **GLUE 2.0** conceptual model (OGF GFD.147) is described in terms of UML class diagrams enriched with descriptive tables providing extra information about the UML elements (e.g., class name definition, properties definition and unit of measure). Three sub-models are present:

- the **main entities** sub-model which captures concepts such as AdminDomain, UserDomain, Service, Resource, and Endpoint;
- the **computing entities** sub-model which is a specialization of the main entities in the context of computing resources (typically batch systems or super computers);
- the **storage entities** sub-model which is a specialization of the main entities in the context of storage systems, ranging from simple disk servers to complex hierarchical storage systems.

Overview of GLUON

GLUON is an AtomPub-based service for providing the functionality of Grid information services. The underlying protocol allows clients to query the GLUE-based information, and also enables information providers to upload new information to be published by the service itself.

Atom categories correspond to GLUE entities (main, computing, storage);
 an **Atom collection** corresponds to a container of related GLUE information; the exact meaning of that can be site-dependent (e.g., define a collection for each VO allowed to access the data)
 an **Atom Media Resource** corresponds to an XML GLUE document rendering, describing a particular (physical) resource whose information are to be published by the GLUON service (e.g., a Computing resource, or a Storage resource)

Consumer interaction

Consumers of the information published by GLUON can query the information service as they would query an Atom-based service:

1. First, the user can get the list of all available collections (container of resources) by accessing the Atom Service Document
2. The user can then browse all available collections to find the URLs of the resources which whose GLUE information are published by GLUON
3. At this point, the user can access the specific XML document containing the GLUE information requested

Information Providers interaction

Information providers need the ability to create a new representation for a resource in the GLUON information service; furthermore, they need the ability to update such information after creation

- The Atom protocol allows creation of a new Resource (or Media Resource) using an HTTP **POST** operation on the corresponding URI on the service
- Resources can be updated by issuing an HTTP **PUT** request on the same URI

