Defining the Grid: A Roadmap for OGSA™ Standards
Version 1.0

Status of This Memo

This memo provides information to the Grid community regarding the roadmap of the Open Grid Services Architecture (OGSA). It does not define any standards or technical recommendations. Distribution is unlimited.

This document contains schedule information for work being carried out by multiple GGF working groups and external organizations. The document will be updated periodically to reflect schedule changes.

Abstract

The Global Grid Forum (GGF) has embraced the Open Grid Services Architecture (OGSA) as the industry blueprint for standards-based grid computing. "Open" refers to the process used to develop standards that achieve interoperability. "Grid" is concerned with the integration, virtualization, and management of services and resources in a distributed, heterogeneous environment. It is "service-oriented" because it delivers functionality as loosely coupled, interacting services aligned with industry-accepted Web service standards. The "architecture" defines the components, their organizations and interactions, and the design philosophy used.

While much progress has been made with OGSA, there remains a lack of clarity concerning exactly what OGSA is, who defines it, what will be defined when, and who is contributing to its development. This informational document answers these questions by providing a snapshot of the evolving OGSA space and an explanation of the direction chosen by OGSA-WG and GGF.

Contents

1. Introduction

The Global Grid Forum (GGF) has embraced the Open Grid Services Architecture (OGSA) as the blueprint for standards-based grid computing. "Open" refers to the process used to develop standards that achieve interoperability. "Grid" is concerned with the integration, virtualization, and management of services and resources in a distributed, heterogeneous environment. It is "service-oriented" because it delivers functionality as loosely coupled, interacting services aligned with industry-accepted Web service standards. The "architecture" defines the components, their organizations and interactions, and the design philosophy used.

GGF's OGSA Working group (OGSA-WG) has recently completed two major work products:

- The OGSA Use Cases document [OGSA Use Cases] describes a set of use cases from a range of enterprise and scientific settings, intended as a source of requirements for OGSA services.

- The Open Grid Services Architecture, Version 1.0 document (also called OGSA Architecture 1.0 in this document) [OGSA Arch] collates requirements for an Open Grid Services Architecture and identifies a large number of service interfaces that may be required to meet those requirements.

The completion of these two documents leads to the question: what is the path by which OGSA should now be further developed and defined? An answer to this question is important to a variety of people:

- Many GGF participants have bought into the notion that OGSA can serve as an overarching architectural framework for different GGF activities. They now want to understand what this framework implies for their work.

- Developers and users want to know "what they can expect when" in terms of standards, so that they can make plans for product developments and technology acquisitions.

Arguably the credibility of OGSA, GGF, and Grid as a whole depends in part on a coherent answer to this question.

These and other pressures encourage the view that we must move quickly to fill out the OGSA definition and produce a set of normative specifications that define in great detail what it means to be OGSA-compliant. However, we must also be aware of a number of other factors:

- The broad importance of Grid and the tight alignment of OGSA with Web services means that further work on OGSA cannot proceed as a purely GGF activity, but must rather be viewed as one (hopefully important) input to a larger process aimed at defining service-oriented solutions to distributed computing problems.

- As in any standardization process, we need to be careful not to standardize prematurely, i.e., standardize without adequate experience and/or buy-in from its eventual users. These issues are particularly important in the case of OGSA, due to the particularly large gap between our ambition and experience.

- While the OGSA design teams have considered a variety of use cases it would seem likely that there are important perspectives that have not yet been considered.

- The OGSA Architecture 1.0 covers a broad technical scope, and to date only a relatively small part of the subject matter has been addressed. Given the need for careful management of the process, the work must be undertaken in stages. Consequently we expect that it will take several years to develop normative documents that cover all of OGSA's capabilities.

These considerations motivate this document, which seeks to clarify the role of OGSA and the steps required to refine its definition by addressing the following issues:

- With a view to clarifying the process by which OGSA definition may proceed, we recommend a process by which technical specifications developed within or outside GGF can be identified as meeting OGSA requirements. The selection and combination of element specifications that are required to achieve interoperability are described in chapter 2.

- With a view to identifying factors that might help prioritize work on OGSA, we identify dependencies among different OGSA interfaces and the interfaces that appear needed within different deployment and application scenarios. The schedule of the first set of informational documents, normative documents, and profiles is described in chapters 3 through 6.

- With a view to identifying external constraints on OGSA, we review major relevant standardization activities external to GGF. We discuss both past activities that have produced specifications on which OGSA can build, and current and planned activities that may contribute to, and/or constrain, OGSA's evolution. The collaborations among major standards development organizations are outlined in chapter 7.

- With a view to illustrating the breadth of interest in OGSA across the grid community, we describe in chapter 8 a range of open-source software projects that are actively engaged in implementing grid components and applications based on OGSA and related specifications. These projects are yielding valuable experience that enables their participants to contribute to the further development of OGSA.

2. OGSA: Process, Specifications, Profiles, and Software

We distinguish between the *OGSA architectural process, OGSA specifications and profiles*, and *OGSA software*: all of these are important to maintain coherence around OGSA and grid standards. These three areas are:

1. OGSA is first and foremost an **architectural process**, managed by the OGSA-WG, which works to collect requirements, evaluate the maturity of specifications, and produce periodic updates to the following OGSA informational documents:

   - A set of informational *OGSA Use Case* documents list end-user application scenarios that are thought to be relevant to OGSA design.

   - The *Open Grid Services Architecture, Version 1.0* [OGSA Arch] identifies framework, taxonomy, and functionality that should be provided to address use case requirements.

   - Service Description documents, which are written and maintained by the appropriate domain-expert working groups, describe the services in the area in natural language, listing the interfaces and operations defined by each service.

   - Scenario documents, also written by domain-expert working groups, demonstrate how these services can implement the use cases, using a combination of natural language and UML.

   - An *OGSA Roadmap,* this document, expresses OGSA-WG views on the likely future evolution of OGSA to address unmet requirements and/or respond to technology evolution.

   We emphasize that these informational documents are intended to provide guidance to OGSA designers, but are not binding on current or future versions of normative OGSA documents.

2. **OGSA specifications and profiles** are normative documents. A **specification** documents the precise technical requirements, typically including interfaces, protocols and behaviors, for a conforming hardware or software component. An **OGSA Profile** identifies a set of broadly adopted normative technical specifications that collectively capture current understanding of what software must do to operate and manage interoperable grid environments. In developing such normative documents, OGSA-WG is informed by, and aligned with, user experiences with software that implements the relevant specifications. *When this document mentions "OGSA" in any normative sense, it refers to such normative documents*.

   See section 2.2 for further discussion of OGSA Profiles.

3. **OGSA software** adheres to OGSA normative specifications and profiles, and thus enables customers to deploy grid solutions that interoperate even when based on different open-source or commercial software vendors' implementations.

At the time of writing, we have OGSA Use Case documents, OGSA Architecture 1.0, and an OGSA WSRF <u>Basic</u> Profile document [OGSA WSRF Basic Profile]. We do not yet have any OGSA-compliant software implementations or OGSA compliance tests. (See section 2.3 for more details.)

OGSA documents will evolve over time. Thus, any discussion of *OGSA* must always be qualified with a version number: e.g., "This software is compliant with OGSA WSRF Basic Profile 1.0," or "OGSA WSRF Basic Profile 1.0 addresses X, Y, and Z in the OGSA Architecture 1.0."

2.1   OGSA Requirements

OGSA requirements are derived from the study of use cases that are felt to be relevant to OGSA's goals of service-oriented infrastructure and grids. Major sources of such use cases and the requirements that derive from them are GGF members, the Enterprise Grid Alliance[1], and potentially other organizations.

2.2   OGSA Profiles

OGSA, in the normative sense, is defined by a set of specifications and *OGSA Recommended Profiles* (also referred to simply as "OGSA Profiles" in this document). The term *profile* is adopted from the WS-Interoperability (WS-I) organization, which has defined a Basic Profile 1.1 [WS-I BP 1.1] as a foundation for Web services interoperability, and also other profiles such as the Basic Security Profile [WS-I BSP 1.0] and Basic Attachments Profile [WS-I AP 1.0] that build on the Basic Profile.

An OGSA Profile, like a WS-I Profile, references a set of technical specifications and prescribes the ways in which those specifications should be implemented and used in order to perform various classes of operation in an interoperable fashion. However, the OGSA Profile is different from WS-I Profile in the sense that OGSA defines feature-rich combinable functionalities while WS-I Profile defines infrastructure-level specifications.

Individually and collectively, the specifications that are combined in an OGSA Profile:

- Address important end-user requirements, such as those described in the OGSA Use Case and Architecture documents;

- Are specified at a level sufficient to enable the development of interoperable implementations;

- Complement the other specifications contained in this and other OGSA Profiles;

- Have implementation experience; and

- Have been adopted—i.e., are already in use by, or have a high degree of expectation that they will soon be in use by, numerous technology providers and consumers.

OGSA Profiles are thus concerned above all with documenting acceptable practice and enabling interoperability, rather than with prescribing practice for the future.

In addition, OGSA Profiles seek to fill apparent gaps in the specifications. For example, the OGSA Security design team has created an XML Schema fragment to include a service's public credential in an endpoint reference (EPR), and the OGSA WSRF Basic Profile team has specified a number of resource property elements that a client can expect to find—e.g., ResourcePropertyNames.

We expect that various OGSA Profiles will be defined over time, each independently versioned. We propose in this document an initial set of such profiles, some of which might be augmented with extension profiles for more advanced functionality.

This approach of defining multiple independent profiles is important because as OGSA grows, no single vendor is likely to implement everything. Profiles allow vendors to claim unambiguously conformance to relevant portions of OGSA. For example, a scheduler vendor might claim conformance to the OGSA Basic Execution Management Profile 1.0, but not to the OGSA Basic Data Profile 1.0.

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[1] http://www.gridalliance.org

We use the term **OGSA Recommended Profile** to assure potential implementers that all of the normative documents—specifications or other profiles—referenced by the Profile meet certain criteria of status and community adoption, as described in the OGSA Profile Definition document [OGSA Profile Definition].

We will also define **OGSA Informational Profiles**, which do not yet meet the criteria required to be OGSA Recommended Profiles, but which are meant to inform the development of technical specifications that might be referenced by OGSA Recommended Profiles in the future. An important task of the OGSA-WG is thus, periodically, to identify and document in revised OGSA Profiles the sets of specifications that meet the criteria outlined above, and to revise the Informational documents based on the latest specifications and community views.

OGSA Recommended and Informational Profiles may be developed either by the OGSA-WG or by domain-expert working groups, but it is important to note that they must adhere to GGF's OGSA branding guidelines, which are discussed in section 2.3.

Members of the OGSA-WG will also engage in development of specifications within appropriate working groups (*not* within the OGSA-WG itself), as well as in coordination and promotion activities aimed at bringing other specifications to the point where they are ready for inclusion in future versions of relevant OGSA Profiles.

The OGSA Profile Definition document outlines how to write Recommended and Informational Profiles that describe collections of specifications and their interactions, and defines the criteria to be used in determining the status and adoption levels of the underlying specifications.

2.3   OGSA Branding

Given the requirement for consistency across OGSA specifications and other documents, GGF defines in [OGSA-Related Naming Guidelines] the criteria to be used in determining whether to brand entities such as working groups and documents with an OGSA prefix.

The OGSA normative documents are expected to be implemented by multiple open-source software (OSS) projects and commercial software vendors. Authors of OGSA Software may claim one of three levels of agreement with the OGSA normative documents:

1. A claim to **implement** a specification or profile is a statement of "best effort" to satisfy the requirements of the specification. There are no test mechanisms to guarantee the correctness of the implementation.

2. A claim of **conformance** to a specification or profile is a statement of intent to interoperate with other conformant implementations. Two or more implementations may test their conformance by testing how well they interoperate. A conformance claim mechanism as defined in the profile should be used to communicate conformance.

3. A claim of **compliance** would imply acceptance by a set of *OGSA Compliance Tests*. At the time of writing no such tests exist.

We may expect that OGSA compliance tests will be developed that define the practical criteria that must be satisfied for a software system to be called "OGSA-compliant." Until such a suite is available, claims of OGSA compliance should not be made.

3. OGSA Informational Document Schedule

This chapter provides the development schedule of OGSA-related informational documents. Informational documents include Use Case documents, Architecture documents, Service Description documents, and Scenario documents.

Documents described in this chapter are GGF Informational Documents (GFD-I), as defined in [GGF Documents].

3.1   OGSA Architecture Version 1.5

The OGSA Architecture 1.0 was released in January 2005. This document will be reviewed and updated to reflect progress by working groups and technical committees within and outside of GGF, and to resolve outstanding tracker items. The new version will be called the OGSA Architecture Version 1.5.

3.1.1   Development Schedule

Changes to this document will be made by OGSA-WG.

Milestone	Date
First draft available	August 2005
Ready for public comment review	October 2005
GFD-I publication	January 2006

Table 3-1 OGSA Architecture 1.5 document schedule

3.1.2   Related Documents

This document will refer to the OGSA Profile documents, and many other documents produced by OGSA-WG, by other GGF working groups, and by other standards development organizations.

The OGSA Glossary 1.5 will be published as a companion document.

3.2   OGSA Glossary Version 1.5

The OGSA Glossary 1.0 was released in January 2005, along with the OGSA Architecture 1.0. It will be updated to include terms that are required as a result of changes made in the OGSA Architecture 1.5, and will be released in conjunction with that document. Existing terms will be reviewed and revised where appropriate, and outstanding tracker items will be resolved.

3.2.1   Development Schedule

Changes to this document will be made by OGSA-WG.

Milestone	Date
First draft available	August 2005
Ready for public comment review	October 2005
GFD-I publication	January 2006

Table 3-2 OGSA Glossary 1.5 document schedule

3.2.2   Related Documents

This document is a companion to the OGSA Architecture 1.5 document.

3.3   OGSA ByteIO Use-Cases Version 1.0

The purpose of this document is to identify the requirements for the OGSA ByteIO interface. It is expected that the use cases will include reading from and writing to a binary file, reading the results of certain DAIS queries and reading data from a sensor, among other scenarios. The intention is that existing APIs, such as the POSIX API, should map easily to the ByteIO Web service interface.

3.3.1   Development Schedule

The OGSA ByteIO working group (ByteIO-WG) is now developing this document.

Milestone	Date
First draft available	June 2005
Ready for public comment review	October 2005
GFD-I publication	March 2006

Table 3-3 OGSA ByteIO use-case 1.0 document schedule

3.3.2   Related Documents

This use-case document is intended to be an input to the normative OGSA ByteIO interface document.

3.4   *OGSA Data Architecture Version 1.0*

The purpose of this document is to describe an overall data architecture for OGSA. It will identify message patterns and interfaces that form part of that architecture. Where possible, it will use existing specifications to form appropriate parts of this architecture, liaising with the groups defining those specifications to encourage them to fit into the overall OGSA picture. Where existing specifications are not available, the document will point out the need for work by other GGF working groups to fill the gaps. The document will not define detailed specifications; these are for other specifications.

3.4.1   Development Schedule

The OGSA Data Architecture working group (OGSA-D) is now developing this document.

Milestone	Date
First draft available	June 2005
Ready for public comment review	December 2005
GFD-I publication	June 2006

Table 3-4 OGSA Data Architecture 1.0 document schedule

3.4.2   Related Documents

This document will make extensive cross-references to other specifications, including WS-DAI, Storage Resource Management (SRM), ByteIO, Data Access and Integration (DAIS), Data Format Description Language (DFDL), GridFTP, Message Transmission Optimization Mechanism (MTOM), SOAP with Attachment (SwA), Resource Namespace Service (RNS), and WS-Naming.

3.5   *Naming Issues in Distributed Systems Version 1.0*

Naming in distributed systems has a rich history and literature, and the basics are very well understood. Traditional distributed systems often have a three-layer naming scheme. Human names such as paths or attributes are mapped to abstract names, which are then mapped to some form of address.

The purpose of this document is to provide background on naming in distributed systems, and the motivation and requirements for naming in OGSA.

3.5.1   Development Schedule

The OGSA-Naming WG developed an early draft of this document while the working group was a design team of the OGSA-WG, and is continuing to develop it for publication.

Milestone	Date
First draft available	June 2005
Ready for public comment review	December 2005
GFD-I publication	June 2006

Table 3-5 OGSA Naming Issues in Distributed Systems 1.0 document schedule

3.5.2   Related Documents

This document is informational only. It does not depend on any other specifications, although it refers to, for example, WS-Addressing, DNS, SGNP, WSRF, and JXTA.

3.6   OGSA Information and Monitoring Architecture Version 1.0

The purpose of this document is to describe an overall architecture for publishing and consuming information for the purpose of monitoring and discovery of grid resources, as well as for higher functionality such as accounting. It will identify the necessary components and describe their relationship and the exposed interfaces.

This document will build on existing GGF documents and use relevant specifications from other groups both within and outside GGF. Continuous involvement with those groups is required in order to align those specifications that are still evolving with OGSA requirements. Where gaps are identified in the overall OGSA picture the document will point them out, to allow the OGSA-WG to take appropriate action. The document will not define any normative specification.

3.6.1   Development Schedule

The development schedule will be discussed at GGF14.

Milestone	Date
First draft available	TBD
Ready for public comment review	TBD
GFD-I publication	TBD

Table 3-6 OGSA Information and Monitoring Architecture 1.0 document schedule

3.6.2   Related Documents

This document will leverage the Grid Monitoring Architecture final GGF document (GFD.7) and reference the InfoD specification once it is published. It will also particularly reference OGSA security and identity management as well as OGSA information and resource models and schemas.

4. OGSA Normative Document Schedule

This chapter provides the development schedule for OGSA-related normative specifications. These documents are the products of domain-expert working groups other than OGSA-WG. The OGSA Profiles reference these documents.

Documents described in this chapter will initially be published as GGF Proposed Recommendations (GFD-R.P), as defined in [GGF Documents]. For each document we provide schedule information and a summary of referenced specifications, including status and adoption levels as defined in the OGSA Profile Definition document [OGSA Profile Definition]. Note that specifications that are considered to be at a foundation level for Web services are not included in the specification summaries.

4.1 OGSA ByteIO Interface Document Version 1.0

Various OGSA design, research, and working groups have identified a need for a simple interface for reading and writing sequences of bytes to and from various sources. This interface document specifies a minimal Web service interface for this functionality. The resultant interface will fit into the overall architecture, and the OGSA ByteIO working group will liaise with other GGF groups, especially the OGSA, GFS, GSM, DAIS, InfoD and SAGA working groups, and also with active projects such as OGSA-DAI, Globus, NextGrid and WSRF.Net.

4.1.1 Development Schedule

The OGSA ByteIO working group (ByteIO-WG) is now developing this interface.

Milestone	Date
First draft available	June 2005
Ready for public comment review	October 2005
GFD-R.P publication	March 2006

Table 4-1 OGSA ByteIO interfaces 1.0 document schedule

An experience document which describes interoperability test among two or more implementations based on this interface will also be produced, and is planned to be available in September, 2005.

4.1.2 Referenced Specifications

This interface should be based on the OGSA WSRF Basic Profile 1.0 [**Error! Reference source not found.**]. The following table shows the referenced specifications and their status and adoption levels.

OGSA Referenced Specifications: ByteIO Interfaces 1.0														
September 1, 2005	Status							Adoption						
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
None														
Profiles														
OGSA WSRF Basic Profile 1.0			<	X				///	///	///	///	///	///	

Legend:
- **X** Specification or profile is currently at this status or adoption level
- **<** Specification or profile is approaching this status or adoption level
- /// Status or adoption level is not applicable

Table 4-2 OGSA ByteIO Interfaces 1.0 referenced specifications

4.1.3 Expected Use

The Basic Data profile, to be developed by the OGSA Data working group, is expected to reference this specification.

4.2   OGSA Basic Execution Services Interface Document Version 1.0

OGSA Basic Execution Services Working Group (BES-WG) is concerned with the interfaces (port types, resource properties, etc.) of *service containers* as defined in the OGSA Architecture 1.0 document. Recall that service containers are execution environments in which other services—including legacy applications—execute. They (service containers) represent execution in the grid. A service container may represent a single processor, a virtual processor, a hosting environment such as .Net, a supercomputer, or a cluster managed by a queue management system such as LSF, PBS, or SGE. Service containers are one part in the overall EMS architecture (also described in OGSA Architecture 1.0).

4.2.1   Development Schedule

The OGSA Basic Execution Services Working Group (BES-WG) is now developing this document.

Milestone	Date
First draft available	June 2005
Ready for public comment review	October 2005
GFD-R.P publication	June 2006

Table 4-3 BES Interfaces 1.0 document schedule

4.2.2   Referenced Specifications

This specification should be based on WS-Naming 1.0, JSDL 1.0, RNS 1.0, and OGSA WSRF Basic Profile 1.0 [**Error! Reference source not found.**]. The following table shows the referenced specifications and their status and adoption levels.

OGSA Referenced Specifications: Basic Execution Services (BES) Interfaces 1.0													
September 1, 2005	Status							Adoption					
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
WS-Naming 1.0							X						X	Input to new WG
Job Submission Description Language (JSDL) 1.0			X									X		
Resource Namespace Service (RNS) 1.0			<	X								X		
Profiles														
OGSA WSRF Basic Profile 1.0			<	X				/////	/////	/////	/////	/////	/////	

Legend: | X | Specification or profile is currently at this status or adoption level
        | < | Specification or profile is approaching this status or adoption level
        | //// | Status or adoption level is not applicable

Table 4-4 BES Interfaces 1.0 referenced specifications

4.2.3   Expected Use

BES is at the "base" of the EMS architecture.

4.3   Job Submission Description Language Specification Version 1.0

The Job Submission Description Language (JSDL) is a language for describing the submission requirements of computational jobs. JSDL 1.0 defines a normative XML schema. No submission API is defined and no assumptions are made about how a JSDL document may be submitted to a job execution system.

In OGSA, JSDL 1.0 is expected to be combined with the work of other groups: WS-Agreement (GRAAP-WG), Basic Execution Service (BES-WG), etc.

4.3.1   Development Schedule

The JSDL-WG has submitted JSDL 1.0 to the GGF editor.

Milestone	Date
First draft available	February 2004
Ready for public comment review	June 2005
GFD-R.P publication	October 2005

Table 4-5 JSDL 1.0 specification schedule

An experience document which describes interoperability tests between two or more implementations based on this specification will also be produced in 2006.

4.3.2   Referenced Specifications

JSDL 1.0 references the Common Information Model (CIM) version 2.9 and ISO/IEC 9945:2003 (POSIX v3).

OGSA Referenced Specifications: Job Submission Description Language Specification 1.0														
September 1, 2005		Status							Adoption						
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
Common Information Model (CIM) 2.9		X									X			
ISO/IEC 9945:2003 (Posix v3)		X							X					
Profiles														
None														

Legend: X   Specification or profile is currently at this status or adoption level
          <   Specification or profile is approaching this status or adoption level
          ▨   Status or adoption level is not applicable

Table 4-6 JSDL 1.0 referenced specifications

Note that implementations of these two specifications are not required to implement JSDL 1.0.

4.3.3   Expected Use

The BES 1.0 is expected to use JSDL 1.0 for the definition of the submission interface. The Basic EMS profile is also expected to use JSDL 1.0 in conjunction with WS-Agreement.

4.4 Resource Namespace Service Specification Version 1.0

Various OGSA design, research, and working groups, including the Grid File System Working Group (GFS-WG), have identified a need for a simple namespace service to accommodate a wide variety of grid applications. This service can be employed to manage the namespace of federated and virtualized data, services, or effectively any resource capable of being referenced in a grid/web service environment, with a particular emphasis on hierarchically managed names that may be used in human interface applications.

The RNS specification describes the operations, resource properties, and semantics of the namespace service. The resultant Web service will fit into the overall architecture, providing a core feature of OGSA.

4.4.1 Development Schedule

The GFS-WG is currently finalizing the recommendation draft of the RNS specification. Ownership will transition to the OGSA-Naming WG after the document has been published as a proposed recommendation.

Milestone	Date
First draft available	November 2004
Ready for public comment review	June 2005
GFD-R.P publication	October 2005

Table 4-7 RNS specification 1.0 document schedule

The RNS specification document is based on a previously posted specification document for Virtual Filesystem Directory Services (VFDS) and was first made available in June of 2004.

4.4.2 Referenced Specifications

RNS exists in the context of the OGSA three-level naming scheme—it makes use of WSRF, WS-Notification, WS-Naming, and WS-Addressing.

OGSA Referenced Specifications: Resource Namespace Service (RNS) Specification 1.0													
September 1, 2005	Status							Adoption					
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
WS-Addressing 1.0		<	X									<	X	IBM, Apache implementing
WS-ResourceProperties 1.2		<	X									<	X	At public review
WS-ResourceLifetime 1.2		<	X									<	X	At public review
WS-BaseFaults 1.2		<	X									<	X	At public review
WS-BaseNotification 1.2				X							X			Stable, June 2004
WS-Naming 1.0							X						X	Input to new WG
Profiles														
None														

Legend:
X | Specification or profile is currently at this status or adoption level
< | Specification or profile is approaching this status or adoption level
▨ | Status or adoption level is not applicable

Table 4-8 RNS 1.0 referenced specifications

Note that a future revision of RNS is expected to reference the OGSA WSRF Basic Profile.

4.4.3   Expected Use

Naming is ubiquitous in OGSA. Thus many documents, including OGSA Architecture 1.5, OGSA Data Architecture 1.0, and OGSA Information and Monitoring Architecture 1.0, may refer to RNS names in one context or the other. Also, multiple normative specifications, including The Grid File System Profile being developed by the GFS-WG, are expected to reference this specification.

4.5   WS-Naming Specification Version 1.0

The WS-Naming Specification describes a standard naming scheme that allows endpoints in a distributed system to be referred to in a high-level, abstract way. WS-Naming builds on the WS-Addressing specification, and extends it in such a way that neither Web service clients nor Web service endpoints need to be aware of the extension, and are free to fail to generate or understand the WS-Naming elements. In such a case, the normal WS-Addressing behavior still works exactly as described in that specification. If Web service clients or Web service endpoints *are* aware of this extension, they can attempt to locate a resilient address even if the peer has failed or encounters communication failures.

4.5.1   Development Schedule

The OGSA-Naming WG is now developing this specification.

Milestone	Date
First draft available	June 2005
Ready for public comment review	November 2005
GFD-R.P publication	March 2006

Table 4-9 WS-Naming 1.0 document schedule

4.5.2   Referenced Specifications

This specification is based on WS-Addressing, and is combinable with the OGSA WSRF Basic Profile 1.0.

OGSA Referenced Specifications: WS-Naming Specification 1.0													
September 1, 2005	Status							Adoption					
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
WS-Addressing 1.0		<	X									<	X	IBM, Apache implementing
Profiles														
None														

Legend: [X] Specification or profile is currently at this status or adoption level
[<] Specification or profile is approaching this status or adoption level
[///] Status or adoption level is not applicable

Table 4-10 WS-Naming Specification 1.0 referenced specifications

4.5.3   Expected Use

This specification is expected to be used by OGSA and many other documents, including OGSA Architecture 1.5, OGSA Data Architecture 1.0, OGSA Information and Monitoring Architecture 1.0, RNS 1.0, and BES 1.0.

4.6   *Application Content Service Specification Version 1.0*

The grid community currently manually creates and manages grid application content consisting of executables, scripts, and data. The Application Content Service (ACS) specification specifies a set of Web services that provide a way to archive components for stable storage and retrieval within a standardized format. This allows grid applications and their data to be packaged, stored, and then referenced over time as needed across domains.

ACS does not interpret or execute information in the contents; rather it just manages the contents for use by other OGSA services.

4.6.1   Development Schedule

The Application Content Service Working Group (ACS-WG) is now developing this specification.

Milestone	Date
First draft available	June 2005
Ready for public comment review	October 2005
GFD-R.P publication	December 2005

Table 4-11 ACS Specification 1.0 document schedule

The final specification is expected to be completed during 2005. The Business Grid Computing project will provide an open-source reference implementation by early 2006.

4.6.2   Referenced Specifications

This specification will refer to OGSA WSRF Basic Profile 1.0 and the Installable Unit Deployment Descriptor (IUDD) specification being developed by the OASIS SDD-TC. Either RNS or WS-Naming is also expected to be referenced, since application archives can be referenced externally.

OGSA Referenced Specifications: Application Content Service (ACS) 1.0														
September 1, 2005	Status							Adoption						
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
Installable Unit Deployment Descriptor 1.0				<			X					X		Input doc from IBM; currently W3C member submission.
Profiles														
OGSA WSRF Basic Profile 1.0			<	X				///	///	///	///	///	///	

Legend:
- **X** Specification or profile is currently at this status or adoption level
- **<** Specification or profile is approaching this status or adoption level
- /// Status or adoption level is not applicable

Table 4-12 ACS 1.0 referenced specifications

4.6.3   Expected Use

Given that ACS and IUDD are complementary, IUDD will refer to ACS in order to cover grid scenarios. Since ACS provides an API to an archive for applications and data, it is anticipated that job management and advanced execution specifications would use the application archive interface for applications under the control of a business manager. Thus future EMS architecture documents and advanced EM profiles may refer to the ACS specification. Also, since the application archive may include multiple component types, including configuration description and job control flow, future versions of the XML-CDL specification may refer to the ACS specification.

4.7   WS-Agreement Specification Version 1.0

This specification defines the Web Services Agreement Specification (WS-Agreement), a Web services protocol for establishing agreement between two parties, such as between a service provider and a consumer. WS-Agreement uses an extensible XML language for specifying the nature of the agreement, and agreement templates to facilitate discovery of compatible agreement terms.

4.7.1   Development Schedule

This specification went through public comment review in December 2004 and January 2005 and received a significant amount of very valuable feedback. The authors are now working to resolve these comments, and are preparing to re-enter the public comment.

Milestone	Date
First draft available	August 2004
Ready for public comment review	June 2005
GFD-R.P publication	October 2005

Table 4-13 WS-Agreement 1.0 document schedule

4.7.2   Referenced Specifications

WS-Agreement normatively refers to WS-ResourceProperties and WS-Addressing.

OGSA Referenced Specifications: WS-Agreement Specification 1.0														
September 1, 2005	Status							Adoption						
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
WS-Addressing 1.0		<	X									<	X	IBM, Apache implementing
WS-ResourceProperties 1.2		<	X									<	X	At public review
Profiles														
None														

Legend: **X** Specification or profile is currently at this status or adoption level
< Specification or profile is approaching this status or adoption level
Status or adoption level is not applicable

Table 4-14 WS-Agreement Specification 1.0 referenced specifications

4.7.3   Expected Use

In OGSA, it is expected that WS-Agreement 1.0 may be used in conjunction with JSDL. The OGSA EMS design team may define a Basic EMS profile referring to WS-Agreement 1.0, and in the future WS-Agreement may be used by other OGSA Profiles, including the proposed OGSA Basic Execution Management Profile.

4.8   Attributes Used in OGSA Authorization Version 1.0

This specification specifies elements and vocabulary for expressing attributes to be used in the context of OGSA authorization. The intention of defining standard formats and meanings (vocabulary) for these assertions is to facilitate interoperability between issuers of attribute assertions and the authorization services that consume them. This specification also defines profiles for using Security Access Markup Language (SAML) attribute assertions and X.509 attribute certificates as the standard OGSA attribute assertions.

4.8.1   Development Schedule

The OGSA Authorization working group (OGSA-Authz-WG) is now developing this specification.

Milestone	Date
First draft available	March 2003
Ready for public comment review	July 2005
GFD-R.P publication	October 2005 (?)

Table 4-15 Attributes Used in OGSA Authorization 1.0 document schedule

The OGSA-Authz-WG is now re-chartering to define the next step of their standardization activities. As a result of the re-chartering discussion, the working group plans to revise the document to adopt the latest versions of the SAML specifications, which have themselves been revised and are available now.

4.8.2   Referenced Specifications

This document is based on the Assertions and Protocols for the OASIS Security Assertion Markup Language (SAML) V1.1 specification [SAML-core-1.1] and RFC 3281—An Internet Attribute Certificate

Profile for Authorization [RFC-3281]. The following table shows the referenced specifications and their status and adoption levels.

OGSA Referenced Specifications: Attributes Used in OGSA Authorization 1.0														
September 1, 2005	Status							Adoption						
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
Assertions & Protocols for SAML 1.1		X								X				
RFC3281: Internet Attribute Certification Profile for Authz		X								X				
Profiles														
OGSA WSRF Basic Profile 1.0			<	X				///	///	///	///	///	///	
WS-I Basic Profile 1.1		X						///	///	///	///	///	///	Final Material
WS-I Basic Security Profile 1.0		<	X					///	///	///	///	///	///	Working Group Draft
WS-I SAML 1.0		<	X					///	///	///	///	///	///	Working Group Draft

Legend: **X** Specification or profile is currently at this status or adoption level
< Specification or profile is approaching this status or adoption level
/// Status or adoption level is not applicable

Table 4-16 Attributes Used in OGSA Authorization 1.0 referenced specifications

4.8.3   Expected Use

The OGSA Security Profile 1.0, to be developed by the OGSA-WG Security design team, is expected to reference this specification.

5. OGSA Recommended Profile Schedule

This chapter provides the development schedule of OGSA Profile documents. These documents will be created by OGSA-WG or other domain-expert working groups. Profile documents described in this section should follow the guidelines set forth in the OGSA Profile Definition document [OGSA Profile Definition].

Documents described in this chapter will initially be published as GGF Proposed Recommendations (GFD-R.P), as defined in [GGF Documents]. For each document we provide schedule information and a summary of referenced specifications, including status and adoption levels as defined in the OGSA Profile Definition document [OGSA Profile Definition]. Note that specifications that are considered to be at a foundation level for Web services are not included in the specification summaries.

5.1   OGSA WSRF Basic Profile Version 1.0

The Profile is intended for use when implementing services that are concerned with distributed resource management, grid computing, or for other purposes that involve the modeling and management of stateful entities. These services frequently can benefit from the use of interfaces and behaviors defined in the WS-Addressing, WS-Resource Framework, and WS-Notification families of specifications.

5.1.1   Development Schedule

The OGSA-WG is now developing this profile.

Milestone	Date
First draft available	May 2005
Ready for public comment review	September 2005
GFD-R.P publication	December 2005

Table 5-1 OGSA WSRF Basic Profile 1.0 document schedule

5.1.2 Referenced Specifications

This profile is based on the WS-I Basic Profile 1.1, WS-Addressing, WS-ResourceProperties, WS-ResourceLifetime, WS-BaseNotification, and WS-BaseFaults. The following table shows the referenced specifications and their status and adoption levels.

OGSA Referenced Specifications: OGSA WSRF Basic Profile 1.0														
September 1, 2005	Status							Adoption						
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
WS-Addressing 1.0		<	X									<	X	IBM, Apache implementing
WS-ResourceProperties 1.2		<	X									<	X	At public review
WS-ResourceLifetime 1.2		<	X									<	X	At public review
WS-BaseFaults 1.2		<	X									<	X	At public review
WS-BaseNotification 1.3		<	X									<	X	At public review
SchemaCentricCanonicalization			X									X		Committee Specification
Profiles														
WS-I Basic Profile 1.1		X						/////	/////	/////	/////	/////	/////	Final Material

Legend:
X Specification or profile is currently at this status or adoption level
< Specification or profile is approaching this status or adoption level
/// Status or adoption level is not applicable

Table 5-2 OGSA WSRF Basic Profile 1.0 referenced specifications

5.1.3 Expected Use

This profile is expected to be the foundation for numerous specifications and profiles being developed by OGSA-WG and other working groups, including ByteIO, Application Content Service (ACS), and Basic Execution Services (BES).

5.2 OGSA Basic Security Profile 1.0 – Secure Channel

The Profile is intended for use when implementing services that are concerned with secure authenticated channel interactions with distributed resources in a grid computing environment. These services frequently can benefit from the use of interfaces and behaviors defined in the WS-Security, Transport Layer Security (TLS), HTTP over TLS, and SAML specifications.

5.2.1 Development Schedule

The OGSA-WG is now developing this profile.

Milestone	Date
First draft available	September 2005
Ready for public comment review	September 2005
GFD-R.P publication	December 2005

Table 5-3 OGSA Basic Security Profile 1.0 – Secure Channel document schedule

5.2.2 Referenced Specifications

This profile is based on the WS-I Basic Security Profile 1.0, TLS, HTTP over TLS, and SAML. The following table shows the referenced specifications and their status and adoption levels.

OGSA Referenced Specifications: OGSA Basic Security Profile 1.0 - Secure Channel														
September 1, 2005		Status						Adoption						
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
WS-Security 1.0		X									X			
XML-Signature		X									X			
Profiles														
WS-I Basic Security Profile 1.0		<	X											Working Group Draft
WS-I SAML 1.0		<	X											Working Group Draft

Legend:
- **X** Specification or profile is currently at this status or adoption level
- **<** Specification or profile is approaching this status or adoption level
- Status or adoption level is not applicable

Table 5-4 OGSA Basic Security Profile 1.0 – Secure Channel referenced specifications

5.2.3 Expected Use

This profile is expected to be the foundation for numerous specifications and profiles being developed by OGSA-WG and other working groups, including ByteIO, ACS, and BES.

5.3 OGSA Basic Security Profile 1.0 – Anonymous Channel

The Profile is intended for use when implementing services that do not require an authenticated communication channel when interacting with distributed resources in a grid computing environment—for example, when the grid and its users are contained within a single enterprise protected by a firewall. These services frequently can benefit from the use of interfaces and behaviors defined in the WS-I Basic Security Profile 1.0.

5.3.1 Development Schedule

The OGSA-WG is now developing this profile.

Milestone	Date
First draft available	September 2005
Ready for public comment review	September 2005
GFD-R.P publication	December 2005

Table 5-5 OGSA Basic Security Profile 1.0 – Anonymous Channel document schedule

5.3.2 Referenced Specifications

This profile is based on the WS-I Basic Security Profile 1.0. The following table shows the referenced specifications and their status and adoption levels.

OGSA Referenced Specifications: OGSA Basic Security Profile 1.0 - Anonymous Channel

September 1, 2005 Specification/Profile Name	Status							Adoption						Note
	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	
Specifications														
Profiles														
WS-I Basic Security Profile 1.0		<	X					////	//	////	////	//	////	Working Group Draft

Legend:
X	Specification or profile is currently at this status or adoption level
<	Specification or profile is approaching this status or adoption level
////	Status or adoption level is not applicable

Table 5-6 OGSA Basic Security Profile 1.0 – Anonymous Channel referenced specifications

5.3.3 Expected Use

This profile is expected to be the foundation for numerous specifications and profiles being developed by OGSA-WG and other working groups, including ByteIO, ACS, and BES.

5.4 Future Profiles

In this section we list some recommended profile documents that are expected to be developed in the future, but for which no significant planning has yet been done.

5.4.1 OGSA Basic Data Profile Version 1.0

The OGSA-D Working Group or a separate profile team will develop a series of OGSA Basic Data Profiles. Specifications that have the potential to be integrated into an OGSA Basic Data Profile 1.0 later in 2005 or early in 2006 might include:

- WS-DAI, SRM, RNS: First versions of these specifications are about to be released in GGF. There is reasonable implementation experience of each; WS-DAI has only a single implementation, while SRM and RNS have multiple implementations.

- ByteIO: This specification is being developed in synchrony with implementations. There is little experience yet but the timescale for ByteIO should lead to adoption in the same timeframe as the initial profile.

- DAIS-WG: Software Resource Information Model (SRIM) gives a specification of relational databases in the CIM model.

5.4.2 OGSA Basic Execution Management Profile Version 1.0

The EMS design team or a separate profile team will develop a series of OGSA Basic Execution Management Profiles. Specifications that have the potential to be integrated into an OGSA Basic Execution Management Profile 1.0 (OGSA-BEM 1.0) later in 2005 or early 2006 might include:

- WS-Agreement, JSDL: First versions of these specifications have been, or are about to be, released by GGF, although as yet have little implementation experience or adoption. Acceptance into OGSA-BEM 1.0 would require that such experience be gained, probably producing revised versions of these specifications.

- OGSA-BES: Similarly to WS-Agreement and JSDL above there is as yet little implementation experience or adoption. Acceptance into OGSA-BEM 1.0 would require that such experience be gained, probably producing revised versions of these specifications.

We will also look into the following specifications.

- Web Services Distributed Management (WSDM): First version has been published as an OASIS standard. Consider if appropriate implementation experience is obtained.

- WS-CIM: Being developed within DMTF. Consider if appropriate implementation experience is obtained.

5.4.3   OGSA Security Profile Version 1.0

The Security design team or one or more separate profile teams will develop a series of OGSA Security Profiles. Specifications that have the potential to be integrated into an OGSA Security Profile 1.0 (OGSA-SP 1.0) in the future might include:

- Attributes Used in OGSA Authorization Version 1.0 (see section 4.8)

We will also look into the following activities, but these are still in their early stages (and they will not develop concrete specifications), so the actual integration would be done in the longer term:

- FI-RG (Firewall Issues Research Group): This research group is to study issues and categorize the related devices around perimeter control stated in the OGSA 1.0 specification.

- TC-RG (Trusted Computing Research Group): This research group is to discuss experiences with Trusted Computing and to develop a use-case document for trusted computing in grid middleware or applications.

6. OGSA Informational Profile Schedule

This chapter is intended to provide the development schedule of OGSA Informational Profile documents. These documents will be created by OGSA-WG or by other domain-expert working groups.

There are no plans to develop any informational profiles at present.

7. Collaboration with Other Organizations

7.1 Liaisons

In order to keep effective and productive communication and solve technical issues with concerted efforts, GGF as a whole or individual working groups maintain liaisons with other standards development organizations and with industry organizations.

Table 7-1 shows OGSA-related liaisons and their goals.

Organization	OGSA-WG Liaison	Goals
DMTF CIM	Fred Maciel	Research how to apply the CIM model in OGSA resource management.
DMTF Utility Computing	Tom Maguire	Research how to apply Utility Computing specifications within OGSA.
OASIS WSRF & OASIS WSN	David Snelling	Input OGSA requirements into the WSRF and WSN specifications.
OASIS WSDM	Fred Maciel	Research how to apply MUWS and MOWS in OGSA resource management.
EGA	Andrew Grimshaw	Understand the EGA use cases and requirements, and evangelize OGSA to their enterprise grid.

Table 7-1 OGSA liaisons and their goals

7.2 *Standards Development Organizations Collaboration on Networked Resources Management (SCRM)*

As a consequence of the successful completion of the OGSA Use Case [OGSA Use Cases] and Architecture documents [OGSA Arch, OGSA Glossary], it is now clear that the magnitude and scope of the work that still needs to be done is greater than the OGSA-WG or even the GGF should attempt on its own. In seeking a way to proceed, we can see that a lot of related work is already carried out in other standards development organizations (SDOs), for example DMTF, IETF, ITU-T, OASIS, SNIA, TMF, and W3C.

In mid-2004, major SDOs began a dialogue to improve comprehensive collaboration on next-generation standards for management of networked and individual resources. The SDOs have agreed to form a cross-institutional technical working group which will create a technologies and specifications landscape document and sort out terminology and taxonomy. This activity is called "Standards Development Organizations Collaboration on Networked Resources Management," or SCRM (pronounced "scrum").

The scope of SCRM centers around the standards associated with the management of resources that are used either in a network or individually, by means of structured data standards. "Management" includes the functions of discovery, deployment, resource availability, statefulness, event coordination, notification and lifecycle tracking. "Resources" to be managed include data objects as well as physical objects such as devices. However, SCRM does not comprehend all standards associated with distributed computing—just those related to the management of networked resources.

The SDOs have formed a new working group (WG) in GGF. However, this does not mean GGF will lead the SCRM work: GGF will provide an infrastructure for SCRM-WG, but the domain experts participating on behalf of the SDOs will equally contribute to and promote the SCRM work. The SCRM-WG is a regular public GGF working group, and anyone can join it.

The first deliverable of the collaboration is a "standards landscape document." The document is an annotated list of interacting standards that enable management of networked resources including gaps, overlaps and timeframes. Table 7-2 shows the development schedule for this document.

Milestone	Date
First draft available	October 2005
Ready for public comment review	January 2006
GFD-I publication	April 2006

Table 7-2 Standards landscape document schedule

8. Open-Source Software Projects

OGSA is expected to be implemented by multiple open-source software (OSS) projects and commercial software vendors. In this section we describe some of the projects whose work is contributing to OGSA in some significant way.

The **Globus Toolkit** (Globus) is an example of a major OSS grid project. The Globus Alliance[2] is contributing to the development of OGSA by supporting the design and implementation of open-source software that implements specifications detailed in OGSA Profiles, and the participation of the implementers of that software in relevant standards processes. With its current version, GT4, based on early implementations of WSRF and WS-Notification and including implementations of all relevant security standards, Globus provides a comprehensive software infrastructure that allows developers and users to work with OGSA concepts now. Additional standards will be incorporated into future versions of the toolkit as they evolve.

The Globus Consortium is a group of companies with a common interest in promoting the development and adoption of the Globus Toolkit for commercial use. Consortium participants also have a strong interest in standards in general, and in OGSA in particular.

The Grid Research team at the **University of Virginia[3] (UVA)** is committed to implementing several pieces of the OGSA Roadmap described here. Specifically, UVA will implement open versions of ByteIO, BES, RNS, and the WS-Naming specifications.

The **Business Grid Computing Project[4]** (BG) is based on the OGSA Architecture specification. It is developing several services using specifications described in this Roadmap. In particular, BG will make available as open source software implementations of the Application Contents Service, JSDL, and WS-Agreement. BG intends to use the OGSA WSRF Basic Profile 1.0.

NextGrid[5] is an EU-funded project to develop an architecture for next-generation grids that will enable their widespread use. The project is taking the OGSA WSRF Basic Profile and also many OGSA use cases as input to its architecture. NextGrid provided initial input to the OGSA Profiles, providing the normative basis in terms of both strategy and content, and will continue to feed architectural ideas into the development of OGSA.

The **National Research Grid Initiative[6]** (**NAREGI**) is a Japanese national e-science grid project aiming at developing a computational infrastructure for supporting scientific and engineering research. One of the primary goals of the NAREGI Project is to contribute to the GGF standardization activities. NAREGI has been interested in, participated in, and, where possible, given feedback to numerous GGF working

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[2] Globus Alliance: http://www.globusalliance.org

[3] Virginia Center for Grid Research: http://www.cs.virginia.edu/~vcgr/standards/main.html

[4] Business Grid Computing Project: http://www.ipa.go.jp/about/english/project/grid.html (English), https://www.ipa.go.jp/software/bgrid/index.html (Japanese)

[5] NextGrid Project: http://www.nextgrid.org

[6] NAREGI Project: http://www.naregi.org/index_e.html (English), http://www.naregi.org (Japanese)

groups and research groups. Amongst the various groups, NAREGI has recently placed high emphasis on the OGSA-WG activities, being the first project or group to implement the EMS architecture described in the OGSA Architecture 1.0 specification, in its alpha incarnation of the software stack that was released in 1Q 2005. Future plans will have NAREGI contribute to and provide reference implementations for Basic Execution Services (BES), Resource Selection Services (RSS), and Application Contents Service (ACS).

The **Open Middleware Infrastructure Institute[7] (OMII)**, located at the University of Southampton, is funded by the UK e-Science Core program. Its open-source distribution of Web services comprises services that are implementing current and emerging GGF- and OGSA-based standards, such as DAIS within the OGSA-DAI project, and JSDL and BES within the GridSAM projects. Both of these initiatives are funded through OMII's managed program.

The **UniGrids Project[8]** will develop a Grid Service infrastructure compliant with the Open Grid Services Architecture (OGSA), and based on the Web Service Resource Framework (WSRF) and the UNICORE Grid software. The guiding principle of the project will be both to adopt and to influence standards in key project areas. The first version of Unicore/GS (the software developed by the UniGrids project) implements WSRF, WS-Addressing and JSDL. The second version of Unicore/GS will additionally implement OGSA-BES and provide support for WS-Security, SAML Authorization, and WS-Notification.

The **Gridbus Project[9]** at the University of Melbourne is a major OSS project focused on the design and development of service-oriented, utility computing grid technologies. The Gridbus project has designed and implemented an open-source version of Grid Service Broker (GSB), a grid workflow management system, GridBank (grid authorization, authentication, and accounting services), an SLA-based facility for allocation of grid resources, and a .NET-based enterprise grid manager.

All of these technologies either currently support or are committed to supporting interfaces that are compliant with specifications from GGF and other bodies. Gridbus makes use of WSRF-compliant technologies in its development of advanced grid services. The project contributes to and provides reference implementations of GSB, with interfaces conforming to the JSDL and Portlets specifications; the GridBank database conforms to Resource Usage Record (RUR); its access interfaces conform to WSRF; and its workflow management system interfaces conform to the Business Process Execution Language (WS-BPEL) specification. Release of the various components under development is planned for late 2005.

9. Security Considerations

It is recognized that there are security requirements related to OGSA. Some aspects of security are covered in OGSA Profiles and related specifications.

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[7] Open Middleware Infrastructure Institute (OMII): http://www.omii.ac.uk/

[8] UniGrids project: http://www.unigrids.org

[9] Gridbus project: http://www.gridbus.org/intro.html

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[WS-I BSP 1.0] WS-I Basic Security Profile 1.0: http://www.ws-i.org/Profiles/BasicSecurityProfile-1.0-2005-01-20.html,

Appendix A – Summary of Referenced Specifications & Profiles

OGSA Referenced Specifications: Copy Master														
September 1, 2005	Status							Adoption						
Specification/Profile Name	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	Unimplemented	Note
Specifications														
None														
WS-Addressing 1.0		<	X									<	X	IBM, Apache implementing
WS-ResourceProperties 1.2		<	X									<	X	At public review
WS-ResourceLifetime 1.2		<	X									<	X	At public review
WS-BaseFaults 1.2		<	X									<	X	At public review
WS-BaseNotification 1.2			X								X			Stable, June 2004
WS-BaseNotification 1.3		<	X									<	X	At public review
WS-Security 1.0		X									X			
XML-Signature		X									X			
SchemaCentricCanonicalization			X									X		Committee Specification
WS-Naming 1.0							X						X	Input to new WG
Job Submission Description Language (JSDL) 1.0			X									X		
Resource Namespace Service (RNS) 1.0			<	X								X		
Installable Unit Deployment Descriptor 1.0				<			X					X		Input doc from IBM; currently W3C member submission.
Common Information Model (CIM) 2.9		X									X			
ISO/IEC 9945:2003 (Posix v3)		X							X					
Assertions & Protocols for SAML 1.1		X								X				
RFC3281: Internet Attribute Certification Profile for Authz		X								X				
Profiles														
None														
OGSA WSRF Basic Profile 1.0			<	X				/////	/////	/////	/////	/////	/////	
WS-I Basic Profile 1.1		X						/////	/////	/////	/////	/////	/////	Final Material
WS-I Basic Security Profile 1.0		<	X					/////	/////	/////	/////	/////	/////	Working Group Draft
WS-I SAML 1.0		<	X					/////	/////	/////	/////	/////	/////	Working Group Draft

Legend:

X	Specification or profile is currently at this status or adoption level
<	Specification or profile is approaching this status or adoption level
///	Status or adoption level is not applicable

Note: This table and all similar tables in this document are copied directly from the OGSA-WG tracking database. Lines labeled "None" have no significance in this copy and may be ignored.