GFD-I.081
Open Grid Services Architecture
http://forge.gridforum.org/projects/ogsa-wg

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July 24, 2006

Open Grid Services Architecture
Glossary of Terms
Version 1.5

Status of This Document

This document provides information to the Grid community regarding the concepts and terms used by the Open Grid Services Architecture (OGSA™) and related documents. It does not define any standards or technical recommendations. Distribution is unlimited.

Abstract

The Open Grid Services Architecture (OGSA) document summarizes current understanding of the functionality required to implement a Grid infrastructure, and the rendering of this functionality into service definitions. In doing so, it uses many terms whose meanings may need clarification. Some of these terms are introduced and explained in the OGSA architecture document, while others are defined in other related documents.

The purpose of this Glossary is to provide an unambiguous definition of such terms as they are used in the context of an OGSA Grid. It is intended to be read in conjunction with the OGSA architecture document, and does not by itself provide background information about Grids, nor attempt to justify the definitions or the context in which they may be used. The reader is referred to external documents for further explanation where necessary.

Contents

1. Introduction

The Open Grid Services Architecture (OGSA) architecture document summarizes current understanding of the functionality required to implement a Grid infrastructure, and the rendering of this functionality into service definitions. In doing so, it uses many terms whose meanings may need clarification. Some of these terms are introduced and explained in the OGSA architecture document, while others are defined in other related documents.

In this document we attempt to provide unambiguous definitions of such terms as they are used in the context of an OGSA Grid. Many of the definitions were arrived at after considerable debate within the OGSA working group, and some continue to be debated, both within the GGF membership and in the Grid and Web services community as a whole. In presenting these definitions we do not attempt to justify them, nor present the arguments that surround them, but we encourage the reader to read the appropriate section of the OGSA architecture document, and to follow any supplied references for a more detailed discussion.

2. Terms

Note: In the following table, words or phrases in *italics* are themselves defined in the table.

Term	Definition	Ref's
A		
AAA	Authentication, authorization and accounting.	[7]
Abstract name	See *name*.	
ACID	Four properties that must generally apply to stateful *resources* used within the context of a transactional unit of work within a traditional, two-phase-commit-enabled transaction system. Briefly: • **Atomicity:** Updates must be made in an all-or-nothing fashion. • **Consistency:** Resources must be left in a consistent state, even in the event of failure. • **Isolation:** Partial updates must not be visible outside of the transaction until the end of the transactional unit of work. • **Durability:** The permanence of updates made under the transactional unit of work. Source: http://en.wikipedia.org/wiki/ACID.	
Address	See *name*.	
Agreement	An agreement defines a dynamically established and dynamically managed relationship between two parties. The object of the relationship is the exchange of services between the parties within the context of the agreement. The management of this relationship is achieved by agreeing on the respective roles, rights and obligations of the parties. The agreement may specify not only functional properties for identification or creation of services, but also non-functional properties of the services such as performance or availability. Entities can dynamically establish and manage agreements via *Web service interfaces*. See https://forge.gridforum.org/projects/graap-wg for information about work being carried out by the GGF's Grid Resource Allocation Agreement Protocol (GRAAP) working group.	
Allocated	See *allocation*.	

Term	Definition	Ref's
Allocation	The process of assigning a set of *resources* for use by a *job*.	
B		
BLAST	Basic Local Alignment Search Tool—a commonly-used biotechnology tool for searching sequence databases. See http://www.ncbi.nlm.nih.gov/BLAST/ for more information.	
C		
Candidate set generator	In *EMS*, a *service* that determines the set of *container resources* on which a service or *job* may execute.	[1]
Capability	In *OGSA*, a set of one or more *services* that together provide a function that is useful in a *Grid* context. OGSA's *Execution Management Services* are an example of an OGSA capability.	[1]
Chargeback	Within an organization, the practice of charging individual departments for the IT *resources* they consume.	
Choreography, orchestration and workflow	The following concepts are closely related: • Choreography describes required patterns of interaction among *services* and templates for sequences (or more structures) of interactions. • Orchestration describes the ways in which business processes are constructed from *Web services* and other business processes, and how these processes interact. • Workflow is a pattern of business process interaction, not necessarily corresponding to a fixed set of business processes. All such interactions may be between services residing within a single data center or across a range of different platforms and implementations anywhere.	[4]
CIM	Common Information Model: An object-oriented model for *resource management*, published by the Distributed Management Task Force (DMTF). See http://www.dmtf.org/standards/cim/ for more information. Also see *WBEM*.	
Client	In a *service-oriented architecture*, a client is a software *component* or other program unit that makes use of the capabilities offered by a *service*.	
Component	An interchangeable part of a system that encapsulates its contents and defines its behavior in terms of its public interfaces.	[9]
Container	See *hosting environment*.	
Context	The conditions and circumstances under which an operation takes place. For example: • In programming languages a calling context is a set of bindings of values to variables. • A *VO* is a possible context for a request to a *service*. • A security context is a set of credentials under which execution can occur.	
CSG	See *candidate set generator*.	

Term	Definition	Ref's
D		
Data model	A mapping of the contents of an *information model* into a form that is specific to a particular type of repository, protocol, platform, etc. It is a rendering of an information model according to a specific set of mechanisms for representing, organizing, storing and handling data. There are typically three parts: • A collection of data structures such as lists, tables, and relations; • A collection of operations that can be applied to the structures such as retrieval, update, and summation; • A collection of integrity rules that define the legal values or changes of state (operations on values). The audience for a data model is implementers. The *WBEM* initiative is an example of an instantiation of *CIM* as a data model. For more information see RFC3444 (http://rfc.net/rfc3444.html).	
Data federation	In OGSA, data federation refers t**o t**he logical integration of multiple data *services* or *data resources* so that they can be accessed as if they were a single service.	
Data resource	An *entity* that can act as a source or sink of data together with its associated framework.	
Deployment	The process of installing components and related contents (e.g. programs and data) on a set of *resources* to meet the requirements of the *job* to which they have been allocated. Deployment may be followed by *resource configuration*.	
Denial-of-service (DoS) attack	A form of attack on a computer system that results in some part of the system being prevented from providing its normal level of service to its users.	
DoS	See *denial of service attack*.	
E		
EMS	See *Execution Management Services*.	
Endpoint, end point	A specific location to which a client may bind in order to access a *Web service*, using a specific protocol and data format.	[3]
Endpoint reference (EPR)	A WS-Addressing construct that identifies a message destination. In *WSRF* an EPR conveys the information needed to identify or reference a stateful *resource*. See http://www.w3.org/2002/ws/addr/ for information about WS-Addressing.	
Entity	Any nameable thing. For example, in *OGSA* an entity might be a *resource* or a *service*.	
EPR	See *endpoint reference*.	
EPS	Execution Planning Service. In OGSA-EMS, a service that establishes relationships between *jobs* and *resources* for *scheduling* purposes.	

Term	Definition	Ref's
Event	Anything that occurs in or to an IT system that is potentially interesting to a person, to some other part of the same system, or to an external system, may be considered to be an event. Information about an event may be expressed as a *log record* and stored in a *log service*. It may also be communicated to other interested *services* through a *notification message*.	
Execution Management Services (OGSA-EMS)	An OGSA *capability* that is concerned with the problems of instantiating and managing, to completion, *units of work*.	[1]
F		
Failure	A state in which a service or other entity is not correctly meeting its specified behavior.	
Failure recovery	Restoration of a *service* or other *entity* to its specified behavior. Recovery might be effected either by correcting the failure condition or by routing subsequent requests to an alternate *entity* that is capable of providing the same service.	
File path	A string in some directory system that can be bound to some file (or pseudo-file)—for example, /home/mydir/data. Usually a file path on one machine is invalid or resolves to a different file on other machines (in the absence of some sort of distributed file system).	
G		
Global Grid Forum (GGF)	A community forum that promotes and supports the development, deployment, and implementation of *Grid* technologies. See http://www.ggf.org for more information.	
GGF	See *Global Grid Forum*.	
GMA	Grid Monitoring Architecture. An architecture that describes a set of monitoring components addressing the characteristics of Grid platforms. GMA was developed by the *GGF's* Performance working group	[14]
Grid	A system that is concerned with the integration, *virtualization*, and *management* of *services* and *resources* in a distributed, heterogeneous environment that supports collections of users and resources (*virtual organizations*) across traditional administrative and organizational domains (*real organizations*).	
Grid fabric	The core set of *service interfaces* that must be implemented in order to realize an *OGSA Grid*. Also known as the OGSA infrastructure services.	
Grid service	The formal definition of this term is deprecated. In general use, a Grid service is a *Web service* that is designed to operate in a *Grid* environment, and meets the requirements of the Grid(s) in which it participates.	[8]
H		
Hosting environment	Any environment in which a task can execute—for example a *Web services* execution environment, an operating system, etc. Also referred to as a *service container*, or simply *container*.	

Term	Definition	Ref's
HTTP	Hypertext Transfer Protocol—a text-based protocol that is commonly used for transferring information across the Internet. See http://www.w3c.org/Protocols for more information.	
HTTPS	Hypertext Transfer Protocol (Secure)—*HTTP* encrypted using *SSL*.	
Human-oriented name	See *name*.	
I		
Identity	An attribute, such as a *name*, that allows one *entity* to be distinguished from all others.	
Information model	An abstraction and representation of entities in a *managed* environment including properties, operations, and relationships. An information model is independent of implementation: that is, it is protocol-neutral, repository-independent, and platform-independent. An information model's level of specificity is varied, dependent on need. It can be described in a formal language such as *UML* or an informal natural language such as English. An information model is useful for designers to describe the managed environment, for administrators to understand the modeled objects, and for implementers as a guide to the functionality that can be described, limited by, and coded in the data models. *CIM* is an example of an object-oriented information model. For more information see RFC3444 (http://rfc.net/rfc3444.html).	
Interface	In a *service-oriented architecture*, a specification of the operations that a service offers its clients.	
Intermediary	In *OGSA information services*, a *service* that decouples *message producers* from *message consumers*. See also *event*.	
IPC	Inter-process communication via *message*-passing, shared memory (including shared files), or *TCP*.	
IRI	Internationalized Resource Identifier: an extension of the *URI* syntax to allow non-Latin characters. The IRI syntax is defined in RFC 3987 (http://rfc.net/rfc3987.html).	
IT	Information technology.	
J		
Job	A user-defined task that is scheduled to be carried out by an execution subsystem. In *OGSA-EMS*, a job is modeled as a *manageable resource*, has an *endpoint reference*, and is *managed* by a *job manager*.	[1]
Job manager	In *OGSA-EMS*, a service that manages a set of one or more *job* instances, which may be structured (e.g. a *workflow* or dependence graph) or unstructured (e.g. an array of non-interacting jobs). The job manager encapsulates all aspects of job execution, including interacting with execution planning *services*, the *provisioning* system, *containers*, and monitoring services. It may also deal with *failures* and restarts, it may schedule *jobs* to *resources*, and it may collect *agreements*,	[1]

Term	Definition	Ref's
	reservations and job service data.	
Job Submission Description Language (JSDL)	A language for describing job submissions, including details of their required execution environments. See https://forge.gridforum.org/projects/jsdl-wg for more information.	
JSDL	See *Job Submission Description Language*.	
K		
L		
Legacy, legacy file system, legacy program	In OGSA, "legacy" is often used to describe pre-existing items such as programs or file systems that must be Grid-enabled before they can be used as Grid *resources*.	
Log record	An expression of an *event* for the purpose of persisting the event in a *logging service*.	
Log service	See *logging service*.	
Logging service	An *intermediary* that serves as a repository for *log records*.	
M		
Manage	See *management*.	
Manageability	The ability to manage a *resource,* or the ability of a resource to be managed.	[12]
Manageability interface	The *interface* through which a *resource* is *managed*.	
Manageable resource	A *resource* that can be *managed* programmatically, either through a *manageability interface* or through some other mechanism such as a policy file.	
Management	The process of taking administrative actions such as *deploying*, configuring, monitoring, metering, tuning, and/or troubleshooting *resources*, either manually or automatically.	[11]
Managed	See *management*.	
Manager	Software that *manages manageable resources*. A manager may or may not require a human operator.	
Message	A self-contained unit of data that is transferred between a *message producer* and one or more *message consumers*.	
Message broker	An *intermediary* in a *messaging service*.	
Message consumer	A *service* that receives a *message*.	
Message producer	A *service* that emits a *message*.	
Messaging service	An *intermediary* used for transmitting *messages* from *message producers* to *message consumers*.	
Metadata	Data that describes data. Metadata may include references to schemas, provenance, and information quality.	
MPI	Message Passing Interface: a standard API for implementing message-passing libraries. MPI libraries are generally used to coordinate activity within parallel applications. See http://www.mpi-forum.org for more information.	

Term	Definition	Ref's
N		
Name	An attribute used to identify an *entity*. In *OGSA-naming*, there are three types of names: human-oriented names, abstract names, and addresses. • A **human-oriented name** is based on a naming scheme that is designed to be easily interpreted by humans (e.g. human-readable and human-parsable). • An **abstract name** is a persistent name suitable for machine processing that does not necessarily contain location information. Abstract names are bound to addresses. • An **address** specifies the location of an entity.	[1]
Notification	A *message* communicating the details of an *event* to an interested party.	
Notification message	See *notification*.	
Notify	Send a *notification message*.	
O		
OGSA	Open Grid Services Architecture.	[1]
OGSA-EMS	See *Execution Management Services.*	
OGSA-Naming	An *OGSA* capability used to associate *names* with *entities*.	[1]
OGSA Information Services	An *OGSA* capability that provides access to information about applications, *resources* and *services*.	[1]
OGSA Infrastructure Services	See *Grid fabric*.	
Orchestration	See *choreography, orchestration and workflow*.	
P		
Policy	Statements, rules or assertions that specify the correct or expected behavior of an *entity*. For example, an authorization policy might specify the correct access control rules for a software *component*.	[10]
Profile	A normative document that aids development of interoperable software components by providing guidance on the use of a collection of specifications or other profiles.	[13]
Provisioning	The activity of specifying, *reserving*, *allocating* and *deploying* the set of *resources* required to accomplish a task.	
Q		
Quality of service (QoS)	A measure of the level of service attained, such as security, network bandwidth, average response time or service availability.	
QoS	See *Quality of service*.	
R		
Real organization	The computers and *resources* that constitute a traditional administrative and organizational domain.	

Term	Definition	Ref's
Registry	An authoritative, centrally-controlled store of information. *Web services* use registries to advertise their existence and to describe their *interfaces* and other attributes. Prospective *clients* query registries to locate required *services* and to discover their attributes.	
Release	The action of returning an *allocated resource* to the pool of available resources.	
Reservation	The process of reserving *resources* for future use by a planned task.	
Resource	In OGSA, a resource is an *entity* that is useful in a Grid environment. The term usually encompasses entities that are pooled (e.g. hosts, software licenses, IP addresses) or that provide a given capacity (e.g. disks, networks, memory, databases). However, entities such as processes, print jobs, database query results and *virtual organizations* may also be represented and handled as resources. See http://www.w3.org/TR/2004/NOTE-ws-arch-20040211/#resource for the WS Architecture definition of this term.	
Resource allocation	See *allocation*.	
Resource configuration	The process of adjusting the configurations of a set of *resources* to meet the requirements of the task to which they have been *allocated*. For example, configuration may involve setting appropriate parameters and storing policies for middleware, O/S, firmware and hardware. Resource configuration may be preceded by *resource deployment*.	
Resource deployment	See *deployment*.	
Resource discovery	The process of searching for *resources* that match some criteria.	
Resource lifecycle management	The process of *managing* resources allocated to a task, from the time of *allocation* until the time of *release*.	
Resource management	A generic term for several forms of *management* that may be applied to *resources*. These include (but are not limited to) typical *IT* systems management activities.	
Resource manager	A *manager* that implements one or more *resource management* functions.	
Resource model	This term is deprecated. Use *information model* and *data model*.	
Resource provisioning	See *provisioning*.	
Resource release	See *release*.	
Resource reservation	See *reservation*.	
Resource virtualization	See *virtualization*.	
S		
Scenario	A scenario is a specific sequence or path of interactions, from initiation to goal, occurring within a particular environment and/or *context*. A *use case* may contain multiple scenarios. OGSA scenarios are high-level and described in a casual style.	

Term	Definition	Ref's
Schedule	A mapping (relation) between *services* and *resources*, possibly with time constraints. A schedule can be extended with a list of alternative *schedule deltas*.	
Schedule deltas	A set of transformations that may be produced for use if some part of the current *schedule* becomes invalid. For example, if a *resource* becomes unavailable, it may be possible to use a schedule delta rather than reschedule the *job* from scratch.	[1]
Scheduling	The process of reserving *resources* for future use by a planned task.	
Self-management	A *capability* by which system *components*—including hardware components, such as computers, networks and storage devices, and software components such as operating systems and business applications—are self-configuring, self-healing and self-optimizing. A self-managing IT infrastructure is less complex and more cost-effective to operate, and can react more quickly to component failures and to changing business needs than can a traditionally-managed environment.	
Service	A software *component* participating in a *service-oriented architecture* that provides functionality and/or participates in realizing one or more *capabilities*.	
Service composition	Aggregation of multiple small *services* into larger services. See http://www.serviceoriented.org for more information.	
Service container	See *hosting environment.*	
Service endpoint	See *endpoint*.	
Service level agreement (SLA)	A contract between a provider and a user that specifies the level of service that is expected during the term of the contract. SLAs are used by vendors and customers, as well as internally by IT shops and their end users. They might specify availability requirements, response times for routine and *ad hoc* queries, and response time for problem resolution (network down, machine failure, etc.). Source: http://www.hostchart.com/webhostingterms.asp.	[10]
Service level attainment	The act of meeting a pre-established *service level objective*.	
Service level manager (SLM)	A service level *manager* ensures that the *service level objectives* for a set of resources are met. Service level management typically entails monitoring availability and performance, analyzing the results of the monitoring activity and projecting future requirements, determining what adjustments, if any, are needed to meet the objectives, and acting accordingly.	

Term	Definition	Ref's
Service level objective (SLO)	A target level of service for a *resource* or a set of resources. A service level objective might be expressed in units such as average response time for a representative set of transaction types, or in terms of the monthly availability of a given *service*.	[10]
Service-oriented architecture (SOA)	This term is increasingly used to refer to an architectural style of building reliable distributed systems that deliver functionality as *services*, with the additional emphasis on loose coupling between interacting services. [1] Note: An SOA can be based on *Web services* (which provide basic interoperability), but it may use other technologies instead.	[5] [6]
Service provider	This term is generally synonymous with *service*. In some contexts it may refer to a person, organization or higher-level system responsible for making a *service* available to *service requestors*.	
Service requestor	This term is generally synonymous with *client*. In some contexts it may refer to a person, organization or higher-level system that makes use of a *service* offered by a *service provider*.	
SLA	See *service level agreement*.	
SLM	See *service level manager*.	
SNMP	Simple Network Management Protocol: a protocol for managing network-attached devices. SNMP is defined by RFC 1157 (http://rfc.net/rfc1157.html). See http://en.wikipedia.org/wiki/Snmp for discussion of this topic.	
SLO	See *service level objective*.	
SOA	See *service-oriented architecture*.	
SOAP	An XML-based protocol for exchanging structured information in a decentralized, distributed environment. [2] See http://www.w3.org/2000/xp/Group and http://www.w3.org/TR/soap12-part1/ for more information.	
SSL	Secure Sockets Layer: a communication protocol whose primary goal is to provide private and reliable communication between two applications. See http://en.wikipedia.org/wiki/Secure_Sockets_Layer for more information. Also see *TLS*.	
T		
TCP	Transmission Control Protocol. A packet-level protocol used to exchange data over the Internet.	
TLS	Transport Layer Security: a secure communication protocol. TLS is a successor to *SSL*, and offers additional security measures. TLS is defined by RFC 2246 (http://rfc.net/rfc2246.html). See http://en.wikipedia.org/wiki/Transport_Layer_Security for discussion of this topic.	

[1] See https://forge.gridforum.org/projects/ogsa-wg/document/Proposed_SOA_Definition/en/1 for additional considerations of service-oriented architecture.

[2] Originally the acronym *SOAP* stood for "Simple Object Access Protocol", but that name is no longer considered by the W3C to be descriptive of its use, so "SOAP" is now considered to be a name rather than an abbreviation.

Term	Definition	Ref's
Trust	The willingness to take actions expecting beneficial outcomes, based on assertions by other parties.	[7]
Trust authority	An *entity* that is trusted to make specified assertions.	[7]
Trust management	Trust management defines *trust authorities* and specifies what they should be trusted to do.	[7]
Trust relationships	*Polices* that govern how *entities* in differing domains honor each other's authorizations. An authority may be completely trusted—for example, any statement from the authority will be accepted as a basis for action—or there may be limited trust, in which case only statements in a specific range are accepted.	[7]
U		
UDDI	Universal Description, Discovery and Integration: a specification that defines a way to publish and discover information about *Web services*. See http://www.uddi.org for more information.	
Unit of work	A request, typically user-defined, to execute an *OGSA* application or a *legacy program*. In *OGSA-EMS*, a unit of work has both a ***manageability* aspect**, represented by a *job*, and an **execution aspect**. Its execution aspect, e.g., a running application or *service*, is managed through the associated job.	[1]
UML	Unified Modeling Language. See http://www.uml.org/ for more information.	
URI	Uniform Resource Identifier: A string used for identifying an abstract or physical *resource*.	
URL	Uniform Resource Locator: the *address* of an Internet resource.	
Use case	A use case captures interactions of an agent or *entity* with a system and/or its constituents, and the expected behavior of the parties as a consequence, where such interactions are directed towards achieving a specific goal. Different sequences of behavior, or *scenarios*, can unfold, depending on the particular requests made and conditions surrounding the interactions. The use case description may include the environment and *context* salient to each scenario. OGSA use cases are high-level and described in a casual style. They are not at the level of detail required for a formal requirements analysis but are intended to provide sufficient detail to inform the architectural definition process. For more information see "Writing Effective Use Cases," Alistair Cockburn, Addison-Wesley Professional; 1st edition (January 15, 2000).	[15]
UUID	Universally-unique identifier.	
V		
Virtualization	See *virtualize*.	
Virtualize	Make a common set of abstract *interfaces* available for a set of similar *resources*, thereby hiding differences in their properties and operations, and allowing them to be viewed and/or manipulated in a common way.	

Term	Definition	Ref's
Virtual organization	A virtual organization (VO) comprises a set of individuals and/or institutions having direct access to computers, software, data, and other *resources* for collaborative problem-solving or other purposes. VOs are a concept that supplies a *context* for operation of the *Grid* that can be used to associate users, their requests, and a set of resources. The sharing of resources in a VO is necessarily highly controlled, with resource providers and consumers defining clearly and carefully just what is shared, who is allowed to share, and the conditions under which sharing occurs.	[1] [1]
VO	See *virtual organization*.	
W		
WBEM	Web Based Enterprise Management: a set of *management* technologies developed to unify the management of enterprise computing environments. WBEM has three main components: the *CIM* resource model; a representation of CIM classes and instances in XML; and a mapping of CIM operations onto HTTP. A means of accessing CIM through *Web services* is currently under development. See http://www.dmtf.org for more information.	
Web service	A software system designed to support interoperable machine- or application-oriented interaction over a network. A Web service has an *interface* described in a machine-processable format (specifically *WSDL*). Other systems interact with the Web service in a manner prescribed by its description using *SOAP* messages, typically conveyed using *HTTP* with an *XML* serialization in conjunction with other Web-related standards.	[3]
Workflow	See *choreography, orchestration and workflow*.	
WSDL	Web Services Description Language—an *XML*-based language for describing *Web services*. See http://www.w3.org/TR/wsdl for more information.	
WSDM	Web Services Distributed Management: A Web services architecture for *managing* distributed *resources*. See http://www.oasis-open.org/apps/org/workgroup/wsdm for more information.	
WS-Notification	A set of proposed specifications dealing with *notification*. See http://www.oasis-open.org/apps/org/workgroup/wsn/ for more information.	
WS-Resource Framework	A set of specifications dealing with the association of *Web services* with stateful *resources*. See http://www.oasis-open.org/specs/ for more information.	
WSN, WS-N	See *WS-Notification*.	
WSRF, WS-RF	See *WS-Resource Framework*.	
X		
XML	Extensible Markup Language—a flexible text format that is used for data exchange. See http://www.w3.org/XML for information.	

Term	Definition	Ref's
Y		
Z		

3. Security Considerations

Security considerations are not applicable to this document.

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6. Acknowledgments

We are grateful to numerous colleagues for discussions on the topics covered in this document, and to the people who provided comments on the public drafts. Thanks in particular to (in alphabetical order, with apologies to anybody we have missed) Greg Astfalk, Karl Czajkowski, Mike Guerette, Sven Graupner, Dejan Milojicic, and Andrea Westerinen.

7. Intellectual Property Statement

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8. Full Copyright Notice

9. References

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