

# Open Grid Forum

## OGF Standards for the Cloud

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**ISO/IEC JTC 1 SC38 Open Meeting and Cloud Summit**

May 18, 2011

**DMTF Alliance Partner Technical Symposium**

May 16-20, Boulder, Colorado

Open Forum – Open Standards

**OPEN GRID FORUM**

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# OGF and the Standards Development Process



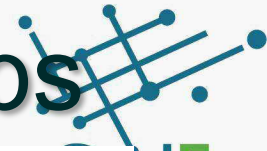
- OGF began, based on previous roots in Grid Forum, Global Grid Forum and the Enterprise Grid Alliance, as an **open community** committed to driving the **rapid adoption** and evolution of **large-scale applied distributed computing**.
- Its current mission is to provide a vehicle for development of **open standards** of practical utility in such infrastructures.
- OGF contributors and members consist of representatives of **large-scale grid and cloud providers** and their user communities, with an emphasis on participants from **high transaction-rate, high throughput and high performance computing** projects.
- It is committed on a long-term basis to an **open, community-based and democratic process** for standards development and organizational operations.

# Overview of Standards Areas



Applications	Architecture
Compute	Data
Infrastructure	Liaison
Management	Security

# OGF Standards Working Groups



**GridForum**  
OPEN STANDARDS

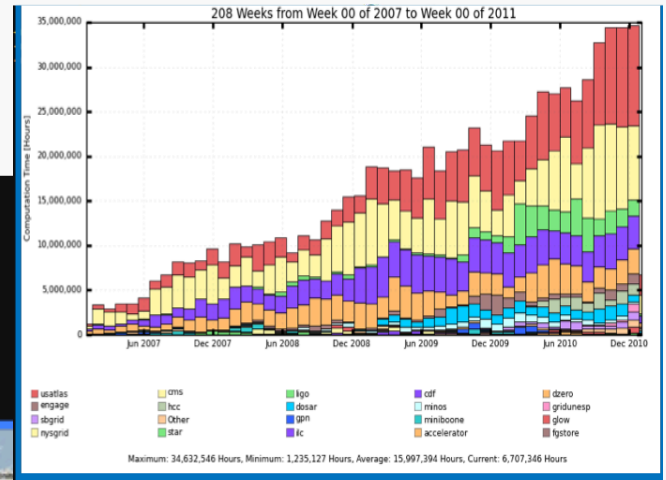
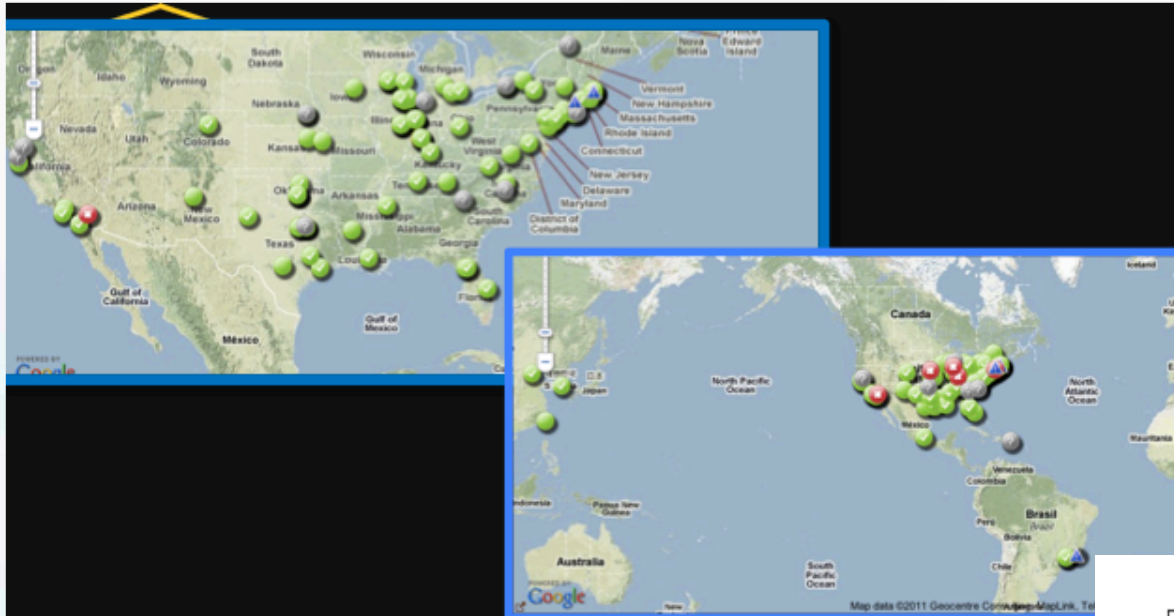
<b>Applications</b>	Distributed Resource Management Application API WG (drmaa-wg) Grid Remote Procedure Call WG (gridrpc-wg) Simple API for Grid Applications WG (saga-wg)
<b>Architecture</b>	OGSA Naming Working Group (ogsa-naming-wg) Open Grid Services Architecture WG (ogsa-wg) Production Grid Infrastructure WG (pgi-wg) Reference Model Working Group (rm-wg)
<b>Compute</b>	Grid Resource Allocation Agreement Protocol WG (graap-wg) Grid Scheduling Architecture RG (gsa-rg) High Performance Computing Profile WG (hpcp-wg) Job Submission Description Language WG (jsdl-wg) OGSA Basic Execution Services WG (ogsa-bes-wg) OGSA Resource Selection Services WG (ogsa-rss-wg)
<b>Data</b>	Data Format Description Language WG (dfdl-wg) Database Access and Integration Services WG (dais-wg) Digital Repositories Research Group (dr-rg) Grid File System Working Group (gfs-wg) Grid Storage Management WG (gsm-wg) GridFTP WG (gridftp-wg) Info Dissemination WG (infod-wg) OGSA ByteIO Working Group (byteio-wg) OGSA Data Movement Interface WG (ogsa-dmi-wg)
<b>Infrastructure</b>	Firewall Virtualization for Grid Applications WG (fvga-wg) Grid High-Performance Networking RG (ghpn-rg) Network Mark-up Language Working Group (nml-wg) Network Measurement and Control WG (nmc-wg) Network Measurements Working Group (nm-wg) Network Service Interface WG (nsi-wg) Open Cloud Computing Interface WG (occi-wg)
<b>Liaison</b>	Standards development organizations Collaboration on networked Resources Management (scrm-wg)
<b>Management</b>	Access to Remote Instrumentation in a distributed environment – Working Group (ari-wg) Distributed Computing Infrastructure Federation Working Group (dcifed-wg) GLUE Working Group (glue) OGSA Resource Usage Service WG (rus-wg) Usage Record WG (ur-wg)
<b>Security</b>	Certificate Authority Operations WG (caops-wg) Firewall Issues RG (fi-rg) Levels of Authentication Assurance Research Group (loa-rg) OGSA Authorization WG (ogsa-authz-wg)

# OGF Initiated, Developed and Shepherded Grid Computing!



- Since its inception in 2001, OGF has developed and encouraged adoption of a large number of standards in
  - compute-intensive,
  - data-intensive,
  - infrastructure-related and
  - job management related topics
- These enjoy a high degree of adoption in **all areas** of grid computing. (Summary at <http://www.ogf.org/standards/>)
- A large number of implementations exist that **permeate the fields of large-scale computational infrastructure** and that **form the basis of the current production-oriented distributed scientific computational and data grids.**

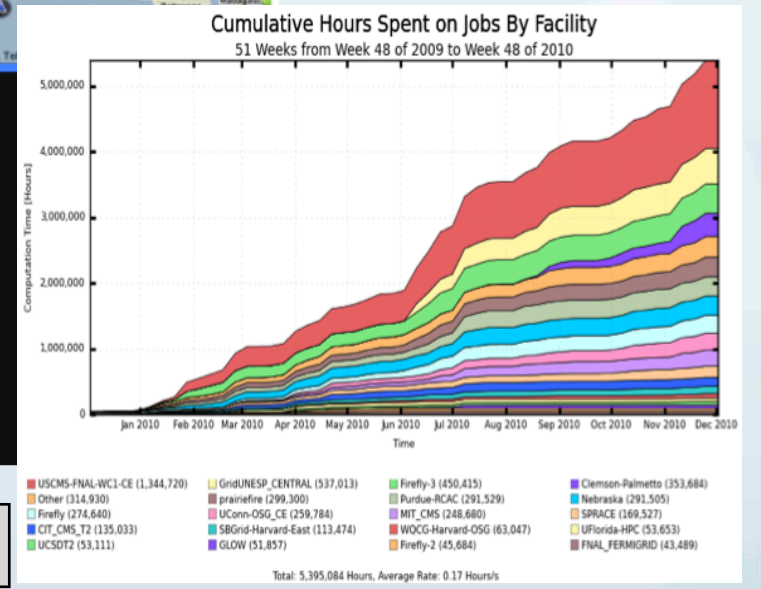
# Open Science Grid in 2011



**Daily Usage of >1,000,000 hours/day  
20 Communities showing usage (~4 are multi-science)**

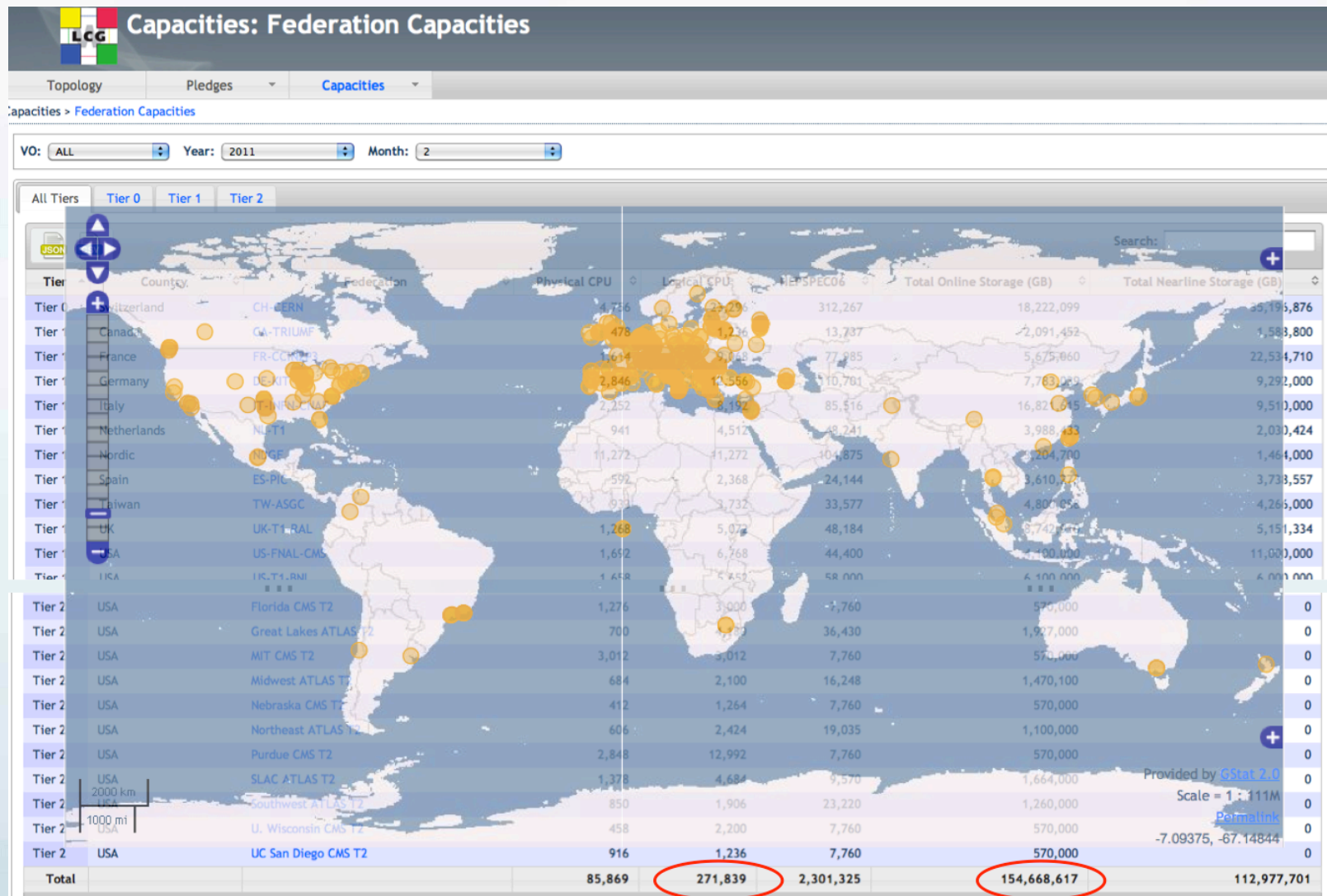
**95 OSG 1.2.X resources**  
**8 are 1.2.18, 6 are 1.2.17**  
**3 OSG 1.0.X resources**  
**2 OSG 1.0.0 resources**  
**1 OSG 0.8.0 resources**  
 OSG, Boston, 2011

**US-Based National Science Shared Infrastructure**





# WLCG in 2011 - One of Many Large-Scale Production Grids:



CPU cores

GBytes online

# OGF and International Standards



- OGF views its mission as integrally tied to the creation and implementation of **practical standards** of use across a wide variety of boundaries.
  - Interoperability and utility for implementation for multiple stakeholders, both commercial and academic, is essential
  - Interoperability and usability across international boundaries for efforts pursued on a global basis is required
- OGF' s approach to standards creation and curation promotes development of standards that will be of use in **large-scale production deployments**.
- Standards are developed by participants in these projects.
- Now extending these efforts to cloud computing.

# OGF Is Also Already Very Active In The Cloud!



- We have recently produced related standards applicable to cloud computing that are rapidly becoming the dominant ones in their categories, including
  - OCCI - Open Cloud Computing Interface
  - DFDL - Data Format Definition Language
  - WS-Agreement (2007) and WS-Agreement Negotiation (just ended public comment) – SLAs and license agreement management in clouds
- We also have formal MoUs and other collaborative working agreements in place with other standards development organizations, including DMTF, SNIA, OGC and CSA.
- There are *dozens of working implementations* of the above standards already in place!

# Open Grid Forum Documents


 Search

## About OGF Documents

### OGF DOCUMENT SERIES

All Active Documents  
 Recommendation  
 Informational  
 Community Practice  
 Experimental  
 Historical Documents

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### DRAFT DOCUMENTS

### EGA DOCUMENTS

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IDARDS

## OGF Document Series

Click on the Document Number (GFD.n) to view the document or view [all the documents in Editor pipeline.](#)

Showing documents 1-10 of 157. | [First](#) | [Prior](#) | [Next](#) | [Last](#) | [All](#)

Document	Title	Document Type	Author(s)	Publication Date	Area/Group
▶ <a href="#">GFD.176</a>	Experiences with Implementing the SAGA Core API	EXP	M. den Burger, M. Franceschini, M. Illingworth, C. Jacobs, S. Jha, H. Kaiser, T. Kielmann, A. Merzky, R. van Nieuwpoort, S. Reynaud, O. Weidner	2011-02-07	<a href="#">Applications SAGA-WG</a>
▶ <a href="#">GFD.175</a>	Translating From DCN to NDL and Back Again	INFO	J. van der Ham	2011-01-24	<a href="#">Infrastructure NML-WG</a>
▶ <a href="#">GFD.174</a>	Data Format Description Language (DFDL) v1.0 Specification	P-REC	A. Powell, M. Beckerle, S. Hanson	2011-01-31	<a href="#">Data DFDL-WG</a>
▶ <a href="#">GFD.173</a>	Network Services Framework v1.0	INFO	G. Roberts, T. Kudoh, I. Monga, J. Sobieski, J. Vollbrecht	2010-12-15	<a href="#">Infrastructure NSI-WG</a>
▶ <a href="#">GFD.172</a>	RNS 1.1 OGSA WSRF Basic Profile Rendering 1.0	P-REC	M. Morgan, O. Tatebe	2010-12-02	<a href="#">Architecture OGSA-Naming-WG</a>
▶ <a href="#">GFD.171</a>	RNS Specification 1.1	P-REC	M. Morgan, A. Grimshaw, O. Tatebe	2010-12-02	<a href="#">Architecture OGSA-Naming-WG</a>
▶ <a href="#">GFD.170</a>	Inter-Domain Controller (IDC) Protocol Specification	INFO	T. Lehman, C. Guok, A. Lake, R. Krzywania, M. Balkcerkiewicz	2011-11-29	<a href="#">Infrastructure NSI-WG</a>
▶ <a href="#">GFD.169</a>	Guidelines for auditing Grid CAs version 1.0	INFO	Y. Tanaka, M. Viljoen, S. Rea	2010-04-19	<a href="#">Security CAOPS-WG</a>
▶ <a href="#">GFD.168</a>	RISGE-RG Collection of Use Cases	INFO	M. Plociennik	2010-04-19	e-Research <a href="#">RISGE-RG</a>
▶ <a href="#">GFD.167</a>	WS-Agreement Specification Version 1.0 Experience Document	EXP	D. Battré, P. Wieder, W. Ziegler	2010-03-08	<a href="#">Compute GRAAP-WG</a>

# OGF standards



The standards and implementations listed here, representing only a partial list of OGF implementations, form the backbone of current business and scientific DCI production distributed computing.

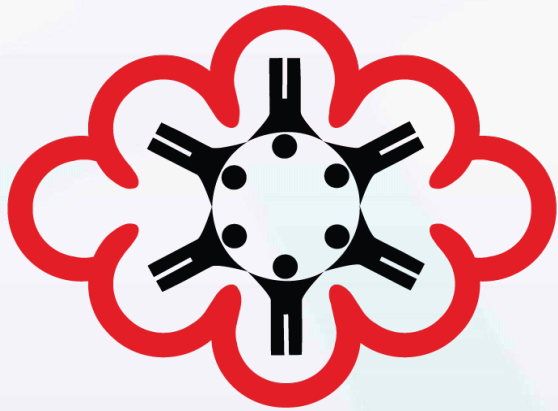
## Implementations of OGF standards

This page contains a list of software implementations of various OGF specifications. The information has been provided by members of the Grid community, and has not been verified by the OGF. As such, the OGF makes no statement about the accuracy of the information provided.

If you have implemented an OGF specification (or several) as part of your project or product and would like to be listed, or would like to report inaccurate information in the table below, please send email to [standards@ogf.org](mailto:standards@ogf.org).

Software / Link	Specifications Implemented	Organization
<a href="#">SAGA-C++</a>	SAGA: GFD.90, GFD.144 C++ and Python bindings	Louisiana State University (USA)
<a href="#">JavaSAGA</a>	SAGA: GFD.90, GFD.144 Java and Python bindings	Vrije Universiteit Amsterdam (Netherlands)
<a href="#">JSAGA</a>	SAGA: GFD.90 partial implementation Java and Python bindings	IN2P3 (France)
<a href="#">DESHL</a>	SAGA: GFD.90 partial implementation Java binding	DEISA (EU), EPCC (UK)
<a href="#">BES++ for LSF/SGE/PBS</a>	BES/HPCBP/JSDL: GFD.108, GFD.111, GFD.114, GFD.136	Platform Computing
<a href="#">Windows HPC Server 2008</a>	BES/HPCBP/JSDL: GFD.108, GFD.111, GFD.114, GFD.136	Microsoft
<a href="#">Genesis II</a>	BES/HPCBP/JSDL: GFD.108, GFD.111, GFD.114, GFD.115, GFD.135, GFD.136, GFD.149 ByteIO: GFD.72, GFD.87, GFD.88 RNS: GFD.101 WS-Naming: GFD.109 Security Profiles: GFD.131, GFD.132, GFD.138	University of Virginia (USA)

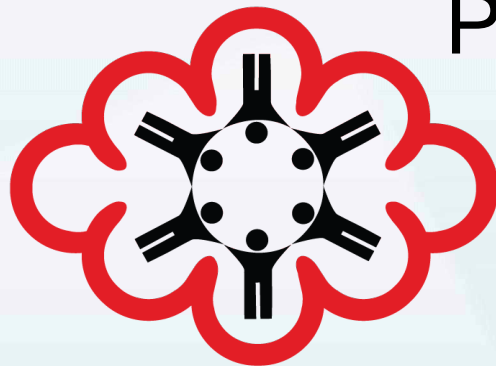
<http://www.ogf.org/gf/page.php?page=Standards::Implementations>



The Cloud Protocol & API

# OPEN CLOUD COMPUTING INTERFACE

# What?

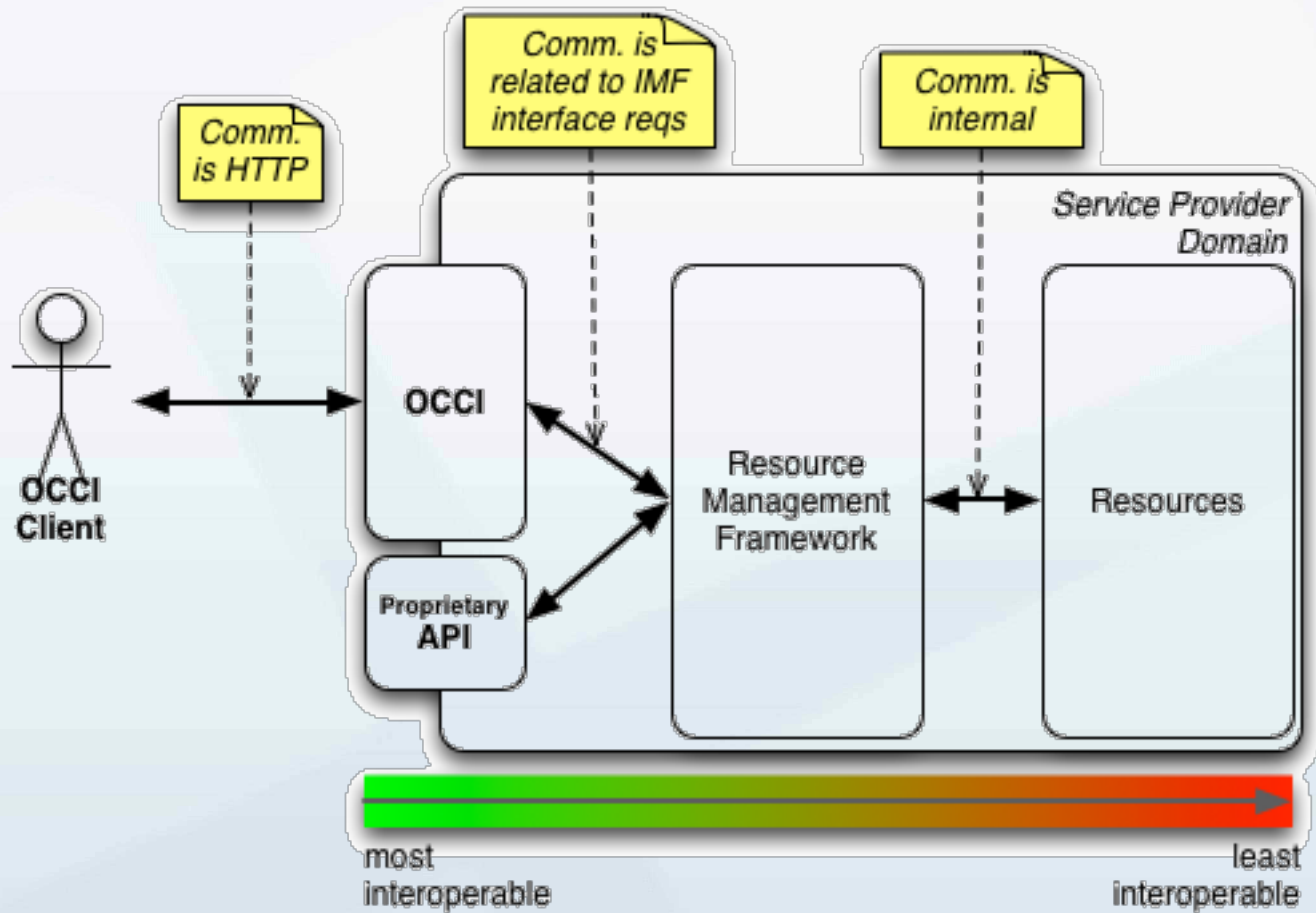


## Protocol and API for Management Of Cloud Service Resources.

*OCCL was originally initiated to create a remote management API for IaaS, PaaS model based Services*

<http://occi-wg.org/about/>

# OCCI's Position





# Goals



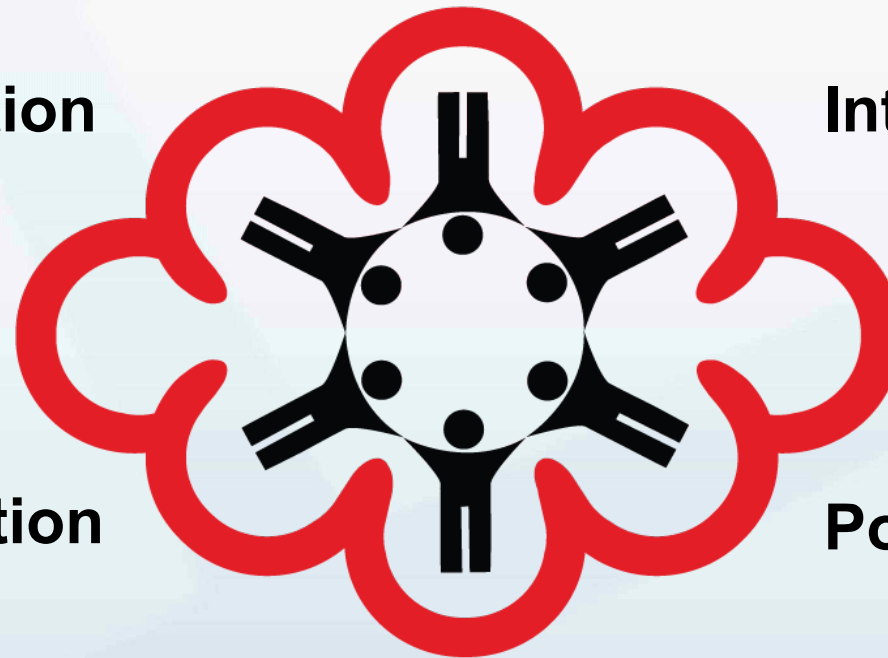
## Community driven and defended

**Innovation**

**Interoperability**

**Integration**

**Portability**

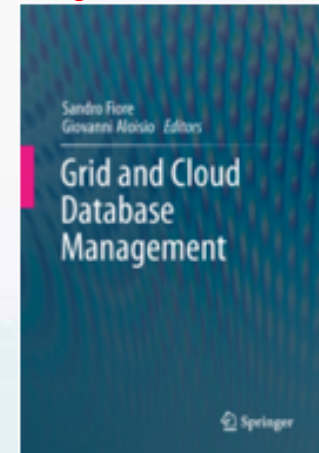


**Open! – no intellectual lock-in**

# OCCI Description



- We focus on **flexibility**, **simplicity**, **extensibility**
- Specification (v1.1)
  - **Modular**: 3 complementary documents
    - Core
    - Infrastructure
    - HTTP
- Model
  - Categorise, identify, link and operate on RESTful resources
    - Resources are Infrastructure e.g. Compute Resource
  - Adaptable, discoverable, extensible, **truly** open
  - Initially targeted at IaaS but can accommodate other levels, including PaaS\*.



• A. Edmonds, T. Metsch, and A. Papaspyrou, "Open Cloud Computing Interface in Data Management-related Setups," Springer Grid and Cloud Database Management, Jul. 2011.

# OCCI Features



- Definition of Basic ‘types’ (compute, storage etc.)
  - Discovery system for supported Resources
  - **Extension** mechanism
- Support of various mechanisms:
  - Dynamic composition
  - Tagging/Grouping of Resources
  - Templating mechanisms
- Resource handling
  - Resources are linkable (Link)
  - Resources are actionable (Action)
- Full CRUD on Resources and Links
  - Current transport is done via HTTP

# OCCI Impact



- Recommended by **UK** G-Cloud, **EU** SIENA Roadmap
- Only open IaaS standard considered so far by **US** NIST
- Agreement reached to submit OCCI to DMTF-CMWG
  - Encourage adoption, increase industry feedback, build collaborative efforts toward future versions
- Work register established for future development
- Many implementations\*
- Testing and tooling support
  - ANTLR lexer/parser
  - Python Test & Compliance tool (both standalone and cloud-based)

The logo for jclouds, featuring the word "jclouds" in a blue, lowercase, sans-serif font.



Eucalyptus

OpenNebula.org

The Open Source Toolkit for Cloud Computing

\* <http://occi-wg.org/community/implementations/>

# Upcoming



- OVF and CDMI interoperability → output of OCCI meetings at this DMTF symposium
- Monitoring & SLA extensions → DGSI (€1.4M), SLA@SOI (€15.2M)
- Planned collaboration with European FP7 SAIL (€20.7M) focused on Networking
- OCCI over AMQP transport (Note: REST does not mandate HTTP!): FI-ware (€43M)



# Summary and Conclusions



- OGF is a well-established vehicle for creation, dissemination, implementation and adoption of useful cross-cutting standards for distributed grid and cloud computing software environments.
- Our *greater than decade-long track record* has produced a very large number of widely adopted standards implemented across many fields.
- OGF' s involvement in cloud computing standards is firmly underway and well established.
- OGF provides a *trusted, effective path* to future software infrastructure standards development.

# Questions



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**Joel Replogle** – replogle at ogf.org

**Andy Edmonds** – andrewx.edmonds at intel.com, @dizz

**Thijs Metsch** – tmetsch at platform.com, @befreax

Twitter: #OCCI

Backup  
**SLIDES**

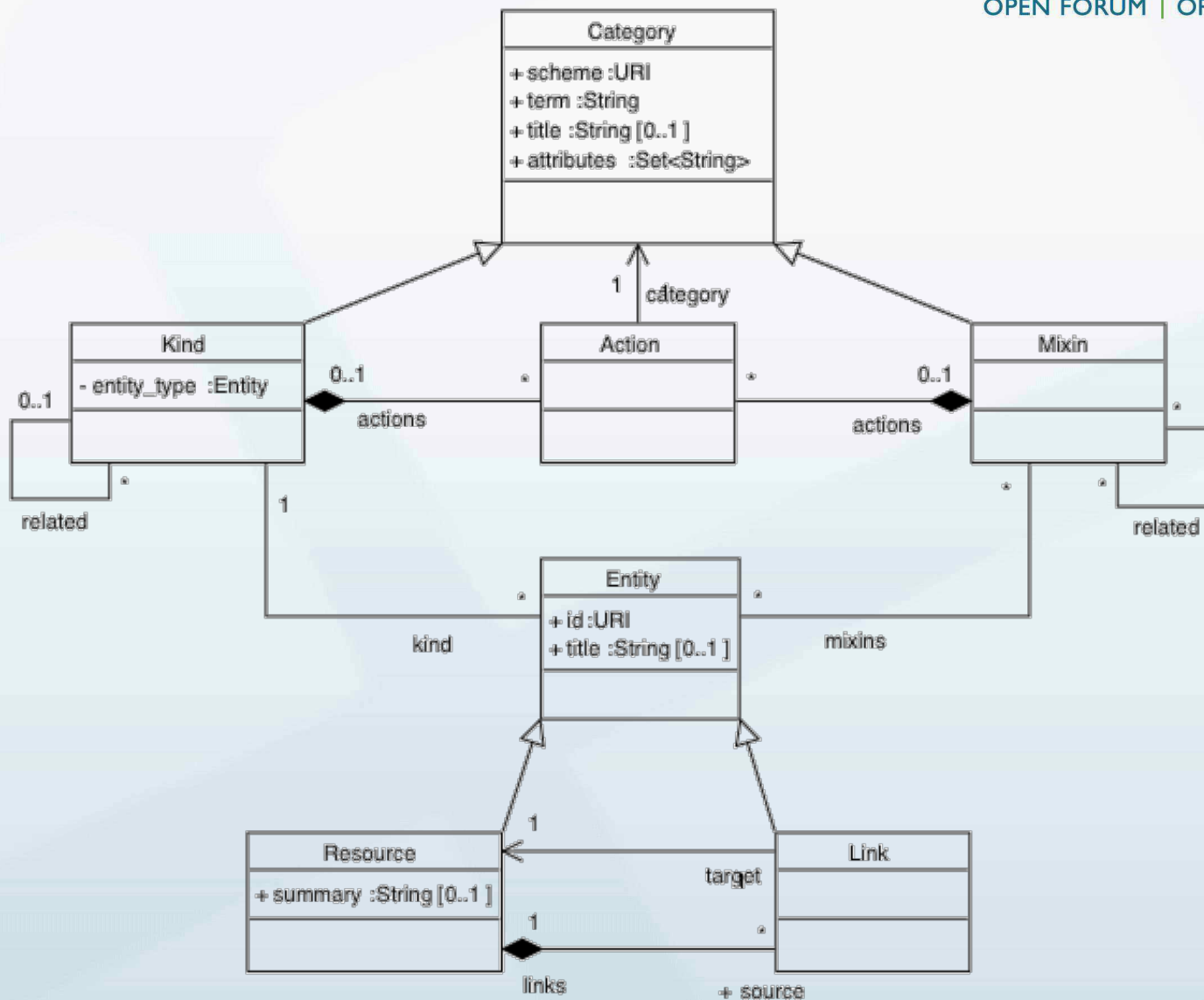


# OCCI Features

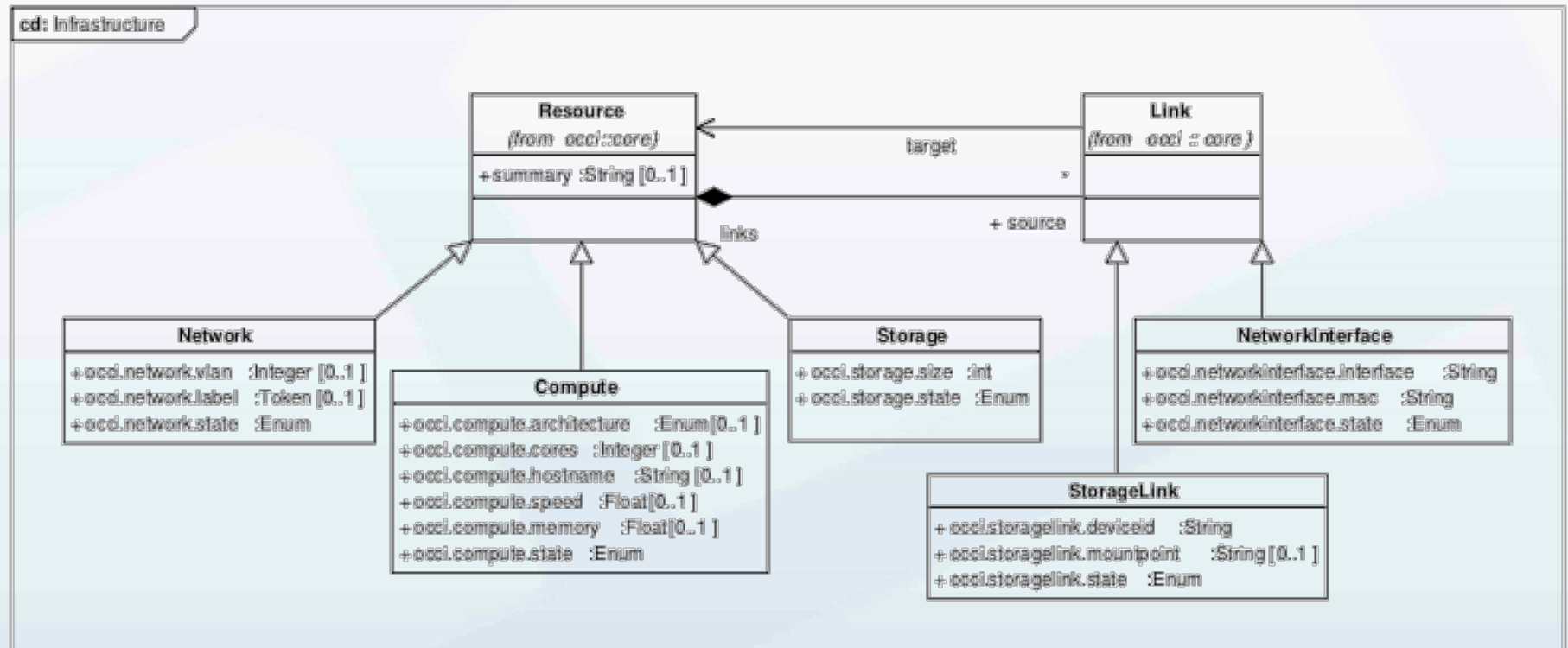


- Discovery system for supported Resources
  - Types (kind, mixins) offered for instantiation are advertised
- Kinds: basic types of a offering (compute, storage etc.)
- Mixins
  - Dynamic composition
  - Tagging
  - OS and Resource Templating
  - Extension mechanism
- Full CRUD on Resources and Links
- Resources are linkable (Link)
- Resources are actionable (Action)
- Batch atomic operations are supported (multipart)
- Current transport == HTTP, resources rendered in header or body

# OCCI Core Model

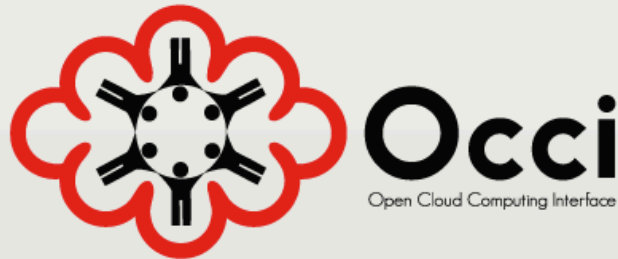


# OCCI Infrastructure Model



**Note** *OCCI::Core Resource and Link are extended by this Model*

# OCCI Working Group



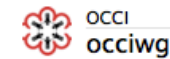
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## About

The Open Cloud Computing Interface (OCCI) is a RESTful Protocol and API for all kinds of Management tasks. OCCI was originally initiated to create a remote management API for IaaS model based Services, allowing for the development of **interoperable** tools for common tasks including deployment, autonomic scaling and monitoring. It has since evolved into an flexible API with a strong focus on interoperability while still offering a high degree of **extensibility**. The current release of the Open Cloud Computing Interface is suitable to serve many other models in addition to **IaaS**, including e.g. **PaaS** and **SaaS**.

In order to be modular and extensible the current OCCI specification is released as a suite of complimentary documents which together form the complete specification. The documents are divided into three categories consisting of the OCCI Core, the OCCI Renderings and the OCCI Extensions.

- ▶ The OCCI **Core** specification consist of a single document defining the OCCI Core Model. The OCCI Core Model can be interacted with renderings (including associated behaviours) and expanded through extensions.
- ▶ The OCCI **Rendering specifications** consist of multiple documents each describing a particular rendering of the OCCI Core Model. Multiple



OCCI  
occiwg

New blog post: **#OCCI Document Series in Public Comment** - <http://occi-wg.org/2011/...>  
15 days ago · reply

**#OpenStack #OCCI integration making slowly progress - #HTML rendering in browser looks nice :-)** <http://twitpic.com/3rg3iu>  
27 days ago · reply

New blog post: **#OCCI compliance Testing Tool** - <http://occi-wg.org/2011/...>  
27 days ago · reply



Join the conversation

## Pages

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