GWD-R
OCCI-WG

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Open Cloud Computing Interface - JSON Rendering

Status of this Document

This document provides information to the community regarding the specification of the Open Cloud Computing Interface. Distribution is unlimited.

Abstract

This document, part of a document series, produced by the OCCI working group within the Open Grid Forum (OGF), provides a high-level definition of a Protocol and API. The document is based upon previously gathered requirements and focuses on the scope of important capabilities required to support modern service offerings.

Comments

Contents

1 Introduction

2 Notational Conventions

All these parts and the information within are mandatory for implementors (unless otherwise specified). The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [**?**].

3 OCCI JSON Rendering

TBD: intro, JSON Rendering is RESTful, can happily co-exist with the existing HTTP Rendering, etc

4 Namespace

The JSON Rendering maps the OCCI Core model into the URL hierarchy by binding Kind and Mixin instances to unique URL paths. Such an URL path is called the *location* of the Kind or Mixin. A provider is free to choose the *location* as long as it is unique within the service provider's URL namespace. For example, the Kind instance[1] for the Compute type may be bound to `/my/occi/api/compute/`.

A Kind instance whose associated type cannot be instantiated MUST NOT be bound to an URL path. This applies to the Kind instance for OCCI Entity.

4.1 Bound and unbound paths

Since a limited set of URL paths are bound to Kind and Mixin instances the URL hierarchy consists of both *bound* and *unbound* paths. A bound URL path is the *location* of a Kind or Mixin collection.

An unbound URL path MAY represent the union of all Kind and Mixin collection "below" the unbound path. RN: FIXME: Should this be a MUST instead?

5 JSON format

The OCCI JSON Rendering uses uses one format to render entities and categories exchanged between an OCCI client and server. The following media-type has been assigned to the OCCI JSON Rendering:

`application/occi+json`

An OCCI client MUST specify the media-type whenever request payload is submitted. Likewise an OCCI server MUST specify the media-type of the response payload. The media-type MUST be specified in the HTTP Content-Type header as specified in RFC2616 [**?**].

5.1 Single resource instance format

A *resource instance* is a sub-type of OCCI Entity which has been instantiated. OCCI Resource and OCCI Link are the top-most sub-types of OCCI Entity. OCCI Entity itself cannot be instantiated.

The single resource instance format consists of a JSON object as shown in the following example. Table 1 define the object members.

[1] `http://schemas.ogf.org/occi/infrastructure#compute`

```
{
    "resources": [
        {
            "attributes": {
                "occi": {
                    "core": {
                        "id": 456,
                        "summary": "This is a summary"
                    },
                    "compute": {
                        "speed": 2,
                        "memory": 4,
                        "cores": 2
                    }
                },
                "org": {
                    "other": {
                        "occi": {
                            "my_mixin": {
                                "my_attribute": "my_value"
                            }
                        }
                    }
                }
            },
            "kind": "http: //schemas.ogf.org/occi/infrastructure#compute",
            "mixins": [
                "http: //schemas.opennebula.org/occi/infrastructure#my_mixin",
                "http: //schemas.other.org/occi#my_mixin"
            ],
            "actions": [
                {
                    "title": "Start My Server",
                    "href": "/compute/456?action=start",
                    "category": "http: //schemas.ogf.org/occi/infrastructure/compute/action#start"
                }
            ],
            "links": [
                {
                 "title": "My disk",
                     "target": "http://myservice.tld/storage/456",
                     "rel": [ "http://schemas.ogf.org/occi/infrastructure#storage" ],
                 "kind": "http://schemas.ogf.org/occi/infrastructure#storagelink"
                 "attributes": { "occi.storagelink.deviceid": "ide:0:1" }
                }
            ]
        }
    ]
}

{
  "kind": "http://schemas.ogf.org/occi/infrastructure#compute",
  "mixins": [ "http://example.com/templates/os#ubuntu-12.04" ],
  "actions": [
    {
      "title": "Start My Server",
```

```
      "href": "/compute/1154cb39-ea39-4a3a-a9da-c480968252f4?action=start",
      "rel": "http://schemas.ogf.org/occi/infrastructure/compute/action#start"
    }
  ],
  "links": [
    {
      "title": "My disk",
      "href": "http://example.com/storage/ff0fcfee-711f-4f33-8202-f0beac5427a6",
      "rel": [ "http://schemas.ogf.org/occi/infrastructure#storage" ],
      "link_href": "http://example.com/link/storage/17aef983-945a-4adf-a841-34abd7445fbb",
      "link_rel": [ "http://schemas.ogf.org/occi/infrastructure#storagelink" ],
      "attributes": { "occi.storagelink.deviceid": "ide:0:1" }
    }
  ],
  "attributes": {
    "occi.core.id": "1154cb39-ea39-4a3a-a9da-c480968252f4",
    "occi.compute.architecture": "x86_64",
    "occi.compute.hostname": "My Server",
    "occi.compute.speed": 2.67,
    "occi.compute.memory": 1.0,
    "occi.compute.state": "inactive"
  }
}
```

Table 1. A single resource instance is rendered using the the `application/occi-entity+json` format which consists of a JSON object with the members described in the table.

Object member	JSON type	Description	Applicable to
kind	string	Kind identifier	Request/response
mixin	array of strings	List of Mixin identifiers	Request/response
actions	array of objects	Actions applicable to the resource instance	Response *only*
links	array of objects	Associated OCCI Links	Request/response. OCCI Resource *only*
attributes	object	Instance attributes	Request/response

5.2 Discovery interface format

The OCCI discovery mechanism enables an OCCI client to discovery the types available for resource instantiation [**?**]. The OCCI JSON Rendering provides an interface to this mechanism called the *discovery interface*[2]. An OCCI client MAY add or remove custom Mixins through the discovery interface.

The discovery interface is rendered in the `application/occi-discovery+json` format. The same format is used for both request and response. The format consists of a JSON object as shown in the example below. Table 2 define the top-level object members. The object members describing a Kind or a Mixin are defined in table 3 while the object members describing a Category[3] are defined in table 4. The object members describing attribute properties are defined in table 5.

```
{
    "kinds": [
        {
            "term": "compute",
```

[2]Referred to as the "Query interface" in the OCCI HTTP Rendering [**?**].
[3]A Category instance is the identifier of an OCCI Action [**?**].

Table 2. The `application/occi-discovery+json` format is used to render the discovery mechanism. The format consists of a JSON object with the following members.

Object member	JSON type	Description	Applicable to
kinds	array of objects	List of Kind instances, see table 3.	Response *only*
mixins	array of objects	List of Mixin instances, see table 3.	Request/response
categories	array of objects	List of Action instances, see table **??**.	Response *only*

Table 3. Table 2 describe that Kind and Mixin instances are rendered as two separate arrays of JSON objects. Each such object has the following members.

Object member	JSON type	Description	Applicable to
term	string	Unique identifier within the categorisation scheme	Request/response
scheme	string	Categorisation scheme	Request/response
title	string	Display name	Request/response
related	string	Identifier of related "parent" Kind or Mixin instance	Request/response
attributes	object of name-object pairs	Attribute properties, see table 5	Request/response
actions	array of strings	List of action identifiers	Response *only*
location	string	URL bound to the Kind or Mixin instance	Request/response

Table 4. A Action instance identifies the category of an action and is only relevant to responses from the discovery interface. Table 2 describe that Action instances are rendered as an array of JSON objects. Each such object has the following members.

Object member	JSON type	Description
term	string	Unique identifier within the categorisation scheme
scheme	string	Categorisation scheme
title	string	Display name
attributes	object	Attribute properties, see table 5

Table 5. Table 3 and 4 define the attribute properties of a Kind, Mixin or Category to be rendered as a JSON object consisting of attribute-name and properties-object pairs. The attribute-properties object has the members defined in this table. All attribute properties are optional and the table shows which property default value an OCCI client MUST assume if a particular property is unspecified. Only the `default` property is valid in client requests to the discovery interface. RN: Should we have both float and integer?

Object member	JSON type	Description	Default
mutable	boolean	Attribute mutability	true
required	boolean	Whether the attribute MUST be specified at resource instantiation	false
type	string	Enum {string, integer, float, boolean}	string
range	2 elements array	Lower and upper bound of an integer/float attribute	-
default	string, number or boolean	Attribute default when not specified by client. Implies required = false	-

```
            "scheme": "http://schemas.ogf.org/occi/infrastructure#",
            "title": "Compute Resource",
            "related": [
                "http://schemas.ogf.org/occi/core#resource"
            ],
            "attributes": {
                "occi": {
                    "compute": {
                        "hostname": {
                            "mutable": true,
                            "required": false,
                            "type": "string",
                            "pattern": "(([a-zA-Z0-9]|[a-zA-Z0-9][a-zA-Z0-9\\-]*[a-zA-Z0-9])\\.)*"
                        },
                        "state": {
                            "mutable": false,
```

```
                            "required": false,
                            "type": "string",
                            "pattern": "inactive|active|suspended|failed",
                            "default": "inactive"
                        },
                        ...
                    }
                }
            },
            "actions": [
                "http://schemas.ogf.org/occi/infrastructure/compute/action#start",
                "http://schemas.ogf.org/occi/infrastructure/compute/action#stop",
                "http://schemas.ogf.org/occi/infrastructure/compute/action#restart",
                "http://schemas.ogf.org/occi/infrastructure/compute/action#suspend"
            ],
            "location": "/compute/"
        },
        ...
    ],
    "mixins": [
        {
            "term": "medium",
            "scheme": "http://example.com/templates/resource#",
            "title": "Medium VM",
            "related": [
                "http://schemas.ogf.org/occi/infrastructure#resource_tpl",
                "http://schemas.ogf.org/occi/infrastructure#compute"
            ],
            "attributes": {
                "occi": {
                    "compute": {
                        "speed": {
                            "type": "number",
                            "default": 2.8
                        }
                    }
                }
            }
        },
        ...
    ]
    {
    "actions": [
        {
            "term": "stop",
            "scheme": "http://schemas.ogf.org/occi/infrastructure/compute/action#",
            "title": "Stop Compute instance",
            "attributes": {
                "method": {
                    "mutable": true,
                    "required": false,
                    "type": "string",
                    "pattern": "graceful|acpioff|poweroff",
                    "default": "poweroff"
                }
            }
```

```
        },
...
]
}
```

6 Glossary

Term	Description
Action	An OCCI base type. Represent an invocable operation on a Entity sub-type instance or collection thereof.
Category	A type in the OCCI model. The parent type of Kind.
Client	An OCCI client.
Collection	A set of Entity sub-type instances all associated to a particular Kind or Mixin instance.
Entity	An OCCI base type. The parent type of Resource and Link.
Kind	A type in the OCCI model. A core component of the OCCI classification system.
Link	An OCCI base type. A Link instance associate one Resource instance with another.
mixin	An instance of the Mixin type associated with a **resource instance**. The "mixin" concept as used by OCCI *only* applies to instances, never to Entity types.
Mixin	A type in the OCCI model. A core component of the OCCI classification system.
OCCI	Open Cloud Computing Interface.
OCCI base type	One of Entity, Resource, Link or Action.
OGF	Open Grid Forum.
Resource	An OCCI base type. The parent type for all domain-specific resource types.
resource instance	An instance of a sub-type of Entity. The OCCI model defines two sub-types of Entity, the Resource type and the Link type. However, the term *resource instance* is defined to include any instance of a *sub-type* of Resource or Link as well.
Tag	A Mixin instance with no attributes or actions defined.
Template	A Mixin instance which if associated at resource instantiation time pre-populate certain attributes.
type	One of the types defined by the OCCI model. The OCCI model types are Category, Kind, Mixin, Action, Entity, Resource and Link.
concrete type/sub-type	A concrete type/sub-type is a type that can be instantiated.
URI	Uniform Resource Identifier.
URL	Uniform Resource Locator.
URN	Uniform Resource Name.

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