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OCCI-WG

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Open Cloud Computing Interface - Infrastructure

Status of this Document

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

Obsoletes

This document obsoletes GFD-xxx [REFERENCE].

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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.

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1 Introduction

The Open Cloud Computing Interface (OCCI) is a RESTful Protocol (and API) for all kinds of Management tasks. 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 now can be used to serve other models as well. To be modular and extensible the current specification itself is currently split into three complimentary documents:

- Core - this defines the OCCI model
- HTTP Rendering - this defines how to manipulate the core model using the OCCI RESTful API. The document defines how the OCCI model can be communicated and thus serialized using HTTP.
- Infrastructure - this defines the infrastructure domain resource types, the required attributes for each and the actions that can be taken on each.

OCCI makes an ideal interoperable boundary interface between the web and the internal resource management system of infrastructure providers.

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.

UML activity diagrams do not specify how OCCI should be rendered but what possible request and outcomes can be.

3 Infrastructure

The main infrastructure domain Resource types within OCCI, including their specification definitions, are:

- Compute: Information processing resources.
- Network: Interconnection resources.
- Storage: Information recording resources.

These infrastructure Resource types inherit the core Resource base type and all its attributes. OCCI implementors MUST implement these types. The HTTP Rendering document defines how to interact with these resource types using RESTful communication.

As REQUIRED by the OCCI Core specification every resource type instantiated that is a subclass of Resource MUST be assigned a Category that identifies the instantiated resource type. Each such Category MUST be related to the Resource base type Category. These Categories, the core categories, MUST always remain immutable to any client.

The following table describe the Category defined for each of the infrastructure Resource subtypes:

Term	Scheme	Title	Attribute	Actions	Related-Category
compute	http://schemas.ogf.org/occi/infrastructure#	Compute Resource	See Below	See Below	http://schemas.ogf.org/occi/infrastructure#
storage	http://schemas.ogf.org/occi/infrastructure#	Storage Resource	See Below	See Below	http://schemas.ogf.org/occi/infrastructure#
network	http://schemas.ogf.org/occi/infrastructure#	Network Resource	See Below	See Below	http://schemas.ogf.org/occi/infrastructure#

The following sections on Compute, Storage and Network detail the Attributes and Actions defined for each resource type.

3.1 Compute

The Compute Resource type is assigned the <http://schemas.ogf.org/occi/infrastructure#compute> Category. A Compute Resource instance MUST at least expose this Category.

3.1.1 Attributes

The attributes that MUST be exposed by an instance of the Compute Resource type are as follows:

Attribute	Type	Multiplicity	Mutability	Description
occi.compute.architecture	String Enumeration, {x86, x64}	1	Mutable	CPU Architecture of the
occi.compute.cores	Integer	1	Mutable	Number of CPU cores
occi.compute.hostname	String	0..1	Mutable	Fully Qualified DNS host
occi.compute.speed	Float, 10^9 (GHz)	1	Mutable	CPU Clock frequency
occi.compute.memory	Float, 10^9 (GiB)	1	Mutable	Maximum RAM in gig
occi.compute.state	Enumeration, {active, inactive, suspended}	1	Immutable	Current state of the in

3.1.2 Actions

Actions can be performed upon instances of the Compute Resource type. The set that MUST be supported are as follows:

Action	Target State	Parameter Attributes
http://schemas.ogf.org/occi/infrastructure/compute/action#start	active	None
http://schemas.ogf.org/occi/infrastructure/compute/action#stop	inactive	String Enumeration
http://schemas.ogf.org/occi/infrastructure/compute/action#restart	active (via stop and start chain)	String Enumeration
http://schemas.ogf.org/occi/infrastructure/compute/action#suspend	suspended	String Enumeration

3.1.3 States

Below illustrates the state diagram based on the actions defined above in REF.

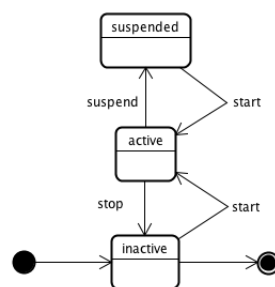


Figure 1: State diagram for Compute

3.2 Network

Network represents a L2 networking entity (e.g. a virtual switch). It can be extended using the mix-in mechanism or sub-classed to support L3/L4 capabilities such as TCP/IP etc. For the purposes of this specification we define a suitable OCCI mix-in so that IP networking can be supported.

The Network Resource type is assigned the <http://schemas.ogf.org/occi/infrastructure#network> Category. A Network Resource instance MUST use and expose this Category.

3.2.1 Attributes

The attributes that MUST be exposed by an instance of the Network Resource type are as follows:

Attribute	Type	Multiplicity	Mutability	Description
occi.network.vlan	Integer, 0-4095	0..1	Mutable	802.1q VLAN Identifier (e.g. 4095).
occi.network.label	Token	0..1	Mutable	Tag based VLANs (e.g. external-dmz).
occi.network.state	Enumeration, active, inactive	1	Immutable	Current state of the instance.

3.2.2 Actions

Actions can be performed upon instances of the Network Resource type. The set that must be supported are as follows:

Action	Target State	Parameters
http://schemas.ogf.org/occi/infrastructure/network/action#up	active	None
http://schemas.ogf.org/occi/infrastructure/network/action#down	inactive	None

3.2.3 States

Below illustrates the state diagram based on the actions defined above.

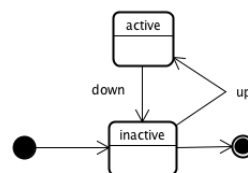


Figure 2: State diagram for Network

3.2.4 IPNetworking Mixin

In order to support L3/L4 capabilities (e.g. IP, TCP etc) an OCCI mixin is herewith defined.

The IPNetworking mixin is assigned the <http://schemas.ogf.org/occi/infrastructure/network#ipnetwork> Category. A IPNetworking mixin MUST use and expose this Category.

Attribute	Type	Multiplicity	Mutability	Description
occi.ipnetwork.address	IPv4 or IPv6 Address range, CIDR notation	0..*	Mutable	Internet Protocol(IP) r
occi.ipnetwork.gateway	IPv4 or IPv6 Address	0..1	Mutable	Internet Protocol(IP) r
occi.ipnetwork.allocation	String Enumeration, {dynamic, static}	0..1	Mutable	Address mechanism: d

3.3 Storage

The Storage Resource type is assigned the <http://schemas.ogf.org/occi/infrastructure#storage> Category. A Storage Resource instance MUST use and expose this Category.

3.3.1 Attributes

The attributes that MUST be exposed by an instance of the Storage Resource type are as follows:

Attribute	Type	Multiplicity	Mutability	Description
occi.storage.size	Float, 10 ⁹ (GiB)	1	Mutable	Storage size in gigabytes o
occi.storage.state	String Enumeration, {online, offline, degraded}	1	Immutable	Current status of the insta

3.3.2 Actions

Actions can be performed upon instances of the Storage Resource type. The set that **MUST** be supported are as follows:

Action	Target State	Parameters
http://schemas.ogf.org/occi/infrastructure/storage/action#online	online	None
http://schemas.ogf.org/occi/infrastructure/storage/action#offline	offline	None
http://schemas.ogf.org/occi/infrastructure/storage/action#backup	None	None
http://schemas.ogf.org/occi/infrastructure/storage/action#snapshot	None	None
http://schemas.ogf.org/occi/infrastructure/storage/action#resize	None	size (Float 10 ⁹ (GiB))

3.3.3 States

Below illustrates the state diagram based on the actions defined above.

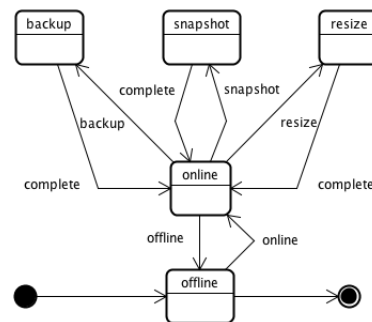


Figure 3: State diagram for Storage

3.4 Linking Infrastructure Resources

In order to create entities like virtual data centres or virtual clusters, it is necessary to allow the linking of the various infrastructure Resource types. This can be accomplished extending the core specification Link entity as the Link entity does not include enough information about specific types of infrastructure links.

3.4.1 Linking to Network Resources

NetworkInterface represents an L2 client device (e.g. network adapter). It can be extended using the mix-in mechanism or sub-classed to support L3/L4 capabilities such as TCP/IP etc.

The Networkinterface Link type is assigned the <http://schemas.ogf.org/occi/infrastructure#networkinterface> Category. A Networkinterface Link instance **MUST** use and expose this Category.

3.4.1.1 Attributes The attributes that **MUST** be exposed by an instance of the NetworkInterface Link type are as follows:

Attribute	Type	Multiplicity	Mutability	Description
occi.networklink.interface	String	1	Immutable	Identifier that relates the link to the interface
occi.networklink.mac	String	1	Mutable	MAC address associated with the interface
occi.networklink.state	String Enumeration{ active, inactive }	1	Immutable	Current status of the instance

3.4.1.2 States Depicted below are the states that a NetworkInterface instance can hold.

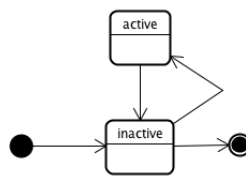


Figure 4: State diagram for NetworkInterface

3.4.1.3 IPNetworkInterface Mixin In order to support L3/L4 capabilities (e.g. IP, TCP etc) with the NetworkInterface Link type an OCCI mixin is herewith defined.

The IPNetworkInterface mixin is assigned the <http://schemas.ogf.org/occi/infrastructure/networkinterface#ipnetworkinterface> Category. An IPNetworking mixin MUST use and expose this Category.

Attribute	Type	Multiplicity	Mutability	Description
occi.networkinterface.ip	IPv4 or IPv6 Address	1	Mutable	Internet Protocol(IP)
occi.networkinterface.gateway	IPv4 or IPv6 Address	0..1	Mutable	Internet Protocol(IP)
occi.networkinterface.allocation	String Enumeration, {dynamic, static}	1	Mutable	Address mechanism: c

3.4.2 Linking to Storage Resources

StorageLink Link type represents a link from a Resource to a target Storage Resource.

The StorageLink Link type is assigned the <http://schemas.ogf.org/occi/infrastructure#storagelink> Category. A StorageLink Link instance MUST use and expose this Category.

3.4.2.1 Attributes The attributes that MUST be exposed by an instance of the StorageLink Link type are as follows:

Attribute	Type	Multiplicity	Mutability	Description
occi.storagelink.device	String	1	Mutable	Device identifier as prese
occi.storagelink.mountpoint	String	0..1	Mutable	Point to where the storag
occi.storagelink.state	String Enumeration{ active, inactive }	1	Immutable	Current status of the inst

3.4.2.2 States Depicted below are the states that a StorageLink instance can hold.

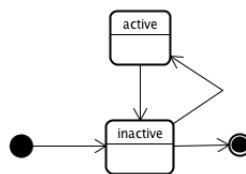


Figure 5: State diagram for StorageLink

4 Contributors

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TBD: Bunch of people missing here - create table...

5 Glossary

Term	Description
OCCI	Open Cloud Computing Interface
URN	Unified Resource Name
URL	TBD
URI	TBD

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9 References

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