

# OSLC Resource Shape: A Linked Data Constraint Language

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# Topics

- About OSLC
- Resource Shape
- Use cases
- Vocabulary
- SPARQL semantics

# Open Services for Lifecycle Collaboration

- “An open community building practical specifications for integrating software”
  - Change Management, Quality Management, Requirements Management, ...
- REST APIs based on Linked Data principles
- Ongoing development transitioning to:
  - W3C (Linked Data Platform)
  - OASIS

# Resource Shape

- Is a high-level, declarative, programmer-friendly description of the expected contents of an RDF graph
  - RDF terms that appear in a graph typically come from many vocabularies
- Defines constraints on RDF graphs
  - unlike RDFS or OWL which define inference rules
- Does not claim to be a complete RDF constraint language
  - Covers commonly occurring cases

# Use cases

- REST APIs
  - Machine-readable constraints on the RDF contained in HTTP request and response bodies
  - Suitable for programmatic validation
- Metadata for tools
  - Query builders
  - Form builders
- Documentation for humans
  - Specifications
  - Online help

# Specification example

The screenshot shows a Mozilla Firefox browser window with the title 'CmSpecificationV2Shapes < Main < TWiki - Mozilla Firefox: IBM Edition'. The address bar shows the URL 'open-services.net/bin/view/Main/CmSpecificationV2Shapes'. The page content includes a navigation menu on the left with links like 'Main Web', 'Create New Topic', 'Index', 'Search', 'Changes', 'Notifications', 'RSS Feed', 'Statistics', and 'Preferences'. The main content area displays the title 'OSLC Change Management 2.0 Appendix B: Resource Shapes' and a description: 'An appendix of the OSLC Change Management 2.0 Specification'. Below this, there is a list of links: 'Overview', 'ChangeRequest', 'foaf:Person', 'oslc:Discussion', and 'oslc:Comment'. The 'Overview' section is expanded, showing a paragraph about the definitions of OSLC CM 2.0 resources. The 'ChangeRequest' section is also expanded, showing an RDF code snippet.

OSLC Change Management 2.0 Appendix B: Resource Shapes

An appendix of the [OSLC Change Management 2.0 Specification](#)

- [Overview](#)
- [ChangeRequest](#)
- [foaf:Person](#)
- [oslc:Discussion](#)
- [oslc:Comment](#)

### Overview

This defines the definitions of the OSLC CM 2.0 defined resources utilizing the OSLC Core Shape Resource definition. Implementations may use these shapes to as a basis for their work, providing their own property additions and additional constraints on OSLC defined properties.

### ChangeRequest

```
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dcterms="http://purl.org/dc/terms/"
  xmlns:foaf="http://xmlns.com/foaf/0.1/"
  xmlns:oslc="http://open-services.net/ns/core#"
  xmlns:oslc_cm="http://open-services.net/ns/cm#">

  <oslc:ResourceShape
    rdf:about="http://example.com/oslc/shapes/ChangeRequest">

    <dcterms:title>CM V2 Change Request</dcterms:title>
    <oslc:describes rdf:resource="http://open-services.net/ns/cm#ChangeRequest" />
    <rdf:type rdf:resource="http://open-services.net/ns/core#ResourceShape" />
```

# Documentation example

**Resource ChangeRequest**

The Change Request resource is a single definition used to define many kinds of change requests such as: defect, enhancement, task, bug, activity, etc. There are a fair number of common properties between these different kinds of change requests and can use some of the properties in the follow definition to identify them.

The Change Request resource properties are not limited to the ones defined in this specification, service providers may provide additional properties. It is recommended that any additional properties exist in their own unique namespace and not use the namespaces defined in these specifications.

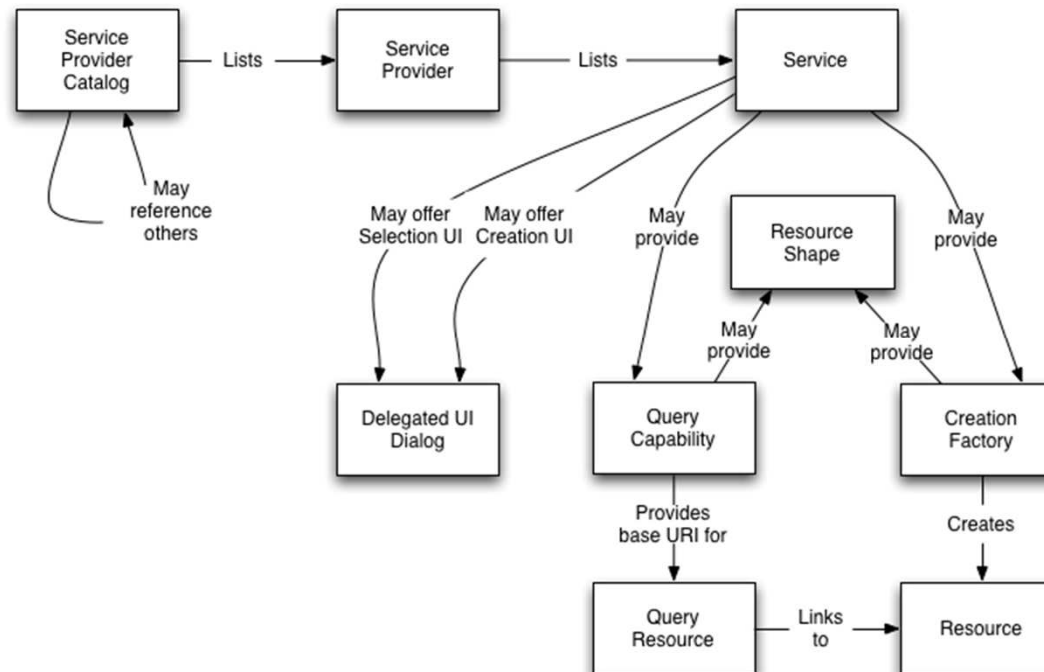
- **Name:** `ChangeRequest`
- **Type URI** `http://open-services.net/ns/cm#ChangeRequest`

Prefixed Name	Occurs	Read-only	Value-type	Representa-tion	Range	Description
<b>OSLC Core: Common Properties</b>						
oslc:shortTitle	zero-or-one	unspecified	XMLLiteral	n/a	n/a	Short name identifying a resource, often used as an abbreviated identifier for presentation to end-users. SHOULD include only content that is valid inside an XHTML <span> element.
dcterms:description	zero-or-one	unspecified	XMLLiteral	n/a	n/a	Descriptive text (reference: Dublin Core) about resource represented as rich text in XHTML content. SHOULD include only content that is valid and suitable inside an XHTML <div> element.
dcterms:title	exactly-one	unspecified	XMLLiteral	n/a	n/a	Title (reference: Dublin Core) or often a single line summary of the resource represented as rich text in XHTML content. SHOULD include only content that is valid and suitable inside an XHTML <div> element.
dcterms:identifier	exactly-one	True	String	n/a	n/a	A unique identifier for a resource. Assigned by the service provider when a resource is created. Not intended for end-user display.

Find:  [Next](#) [Previous](#) [Highlight all](#) ☐ Match case

# Vocabulary

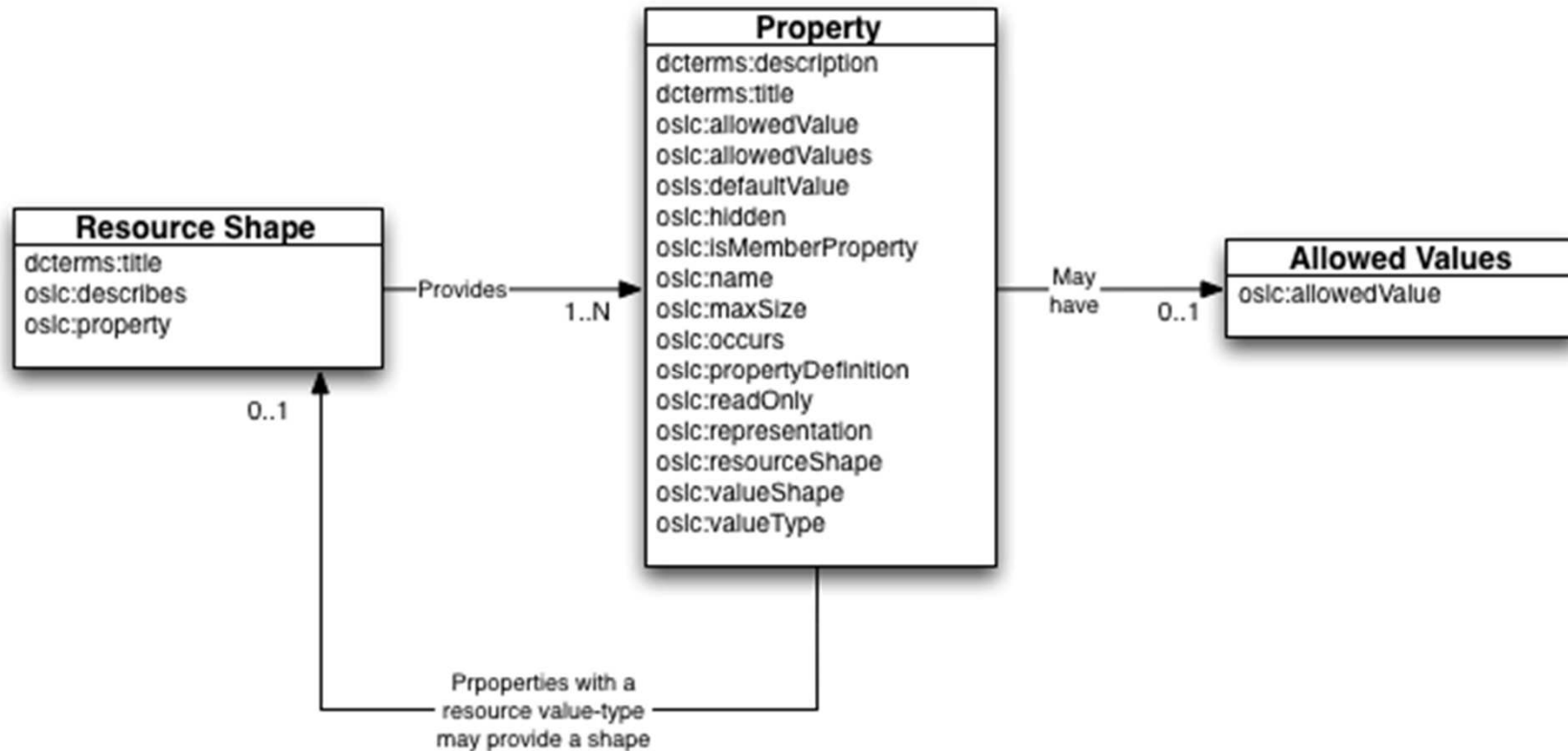
- Defined by [OSLC Core V2.0](#)





# Vocabulary

- RDF terms are defined in [Appendix A](#)



# Example

@prefix dcterms: <http://purl.org/dc/terms/> .  
@prefix oslc: <http://open-services.net/ns/core#> .  
@prefix oslc\_cm: <http://open-services.net/ns/cm#> .

@base <http://example.com/shape/oslc-change-request> .

<> a oslc:ResourceShape ;  
    dcterms:title "Creation shape of OSLC Change Request" ;  
    oslc:describes oslc\_cm:ChangeRequest ;  
    oslc:property <#dcterms-title>, <#oslc\_cm-status> .

<#dcterms-title> a oslc:Property ;  
    oslc:propertyDefinition dcterms:title ;  
    oslc:occurs oslc:Exactly-one .

<#oslc\_cm-status> a oslc:Property ;  
    oslc:propertyDefinition oslc\_cm:status ;  
    oslc:occurs oslc:Zero-or-one .

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## Resource: Resource Shape

A Resource Shape resource can have a title and a set of types.

- Resource:** `oslc:ResourceShape`
- Namespace URI:** `http://open-services.net/ns/core#`
- Suggested Namespace Prefix:** `oslc`

Prefixed Name	Occurs	Read-only	Value-type	Representation	Range	Description
<code>dc:terms:title</code>	zero-or-one	True	XMLLiteral	n/a	n/a	Title of the resource shape. <b>SHOULD</b> include only content that is valid and suitable inside an XHTML <code>&lt;span&gt;</code> element.
<code>oslc:describes</code>	zero-or-many	True	Resource	Reference	n/a	This shape describes resources that are of any of these types. Formally, a shape <code>S</code> applies to a resource <code>R</code> if there is a triple <code>R rdf:type T</code> and there is a triple <code>S oslc:describes T</code> .
<code>oslc:property</code>	zero-or-many	True	Resource	Inline	<code>oslc:Property</code>	The properties that are allowed or required by this shape.

## Resource: Allowed Values

Allowed values for one property.

- Resource:** `oslc:AllowedValues`
- Namespace URI:** `http://open-services.net/ns/core#`
- Suggested Namespace Prefix:** `oslc`

Prefixed Name	Occurs	Read-only	Value-type	Representation	Range	Description
<code>oslc:allowedValue</code>	one-or-many	True	Same value-type as property	n/a	n/a	value allowed for a property

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### Value-type: Property

A Property resource describes one allowed or required property of a resource.

- **Resource:** `oslc:Property`
- **Namespace URI:** `http://open-services.net/ns/core#`
- **Suggested Namespace Prefix:** `oslc`

Prefixed Name	Occurs	Read-only	Value-type	Representation	Range	Description
<code>dcterms:description</code>	zero-or-one	True	XMLLiteral	n/a	n/a	Description of the property. <b>SHOULD</b> include only content that is valid and suitable inside an XHTML <div> element.
<code>dcterms:title</code>	zero-or-one	True	XMLLiteral	n/a	n/a	Title of the property. <b>SHOULD</b> include only content that is valid and suitable inside an XHTML <span> element.
<code>oslc:allowedValues</code>	zero-or-one	True	Resource	Reference	<code>oslc:AllowedValues</code>	Resource with allowed values for the property being defined.
<code>oslc:allowedValue</code>	zero-or-many	True	Same value-type as the property being defined	n/a	n/a	A value allowed for property, inlined into property definition. If there are both <code>oslc:allowedValue</code> elements and an <code>oslc:allowedValue</code> resource, then the full-set of allowed values is the union of both.
<code>oslc:defaultValue</code>	zero-or-one	True	Same as	n/a	n/a	A default value for

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<code>oslc:defaultValue</code>	zero-or-one	True	Same as property defined	n/a	n/a	A default value for property, inlined into property definition.
<code>oslc:hidden</code>	zero-or-one	True	Boolean	n/a	n/a	A hint that indicates that property <b>MAY</b> be hidden when presented in a user interface
<code>oslc:isMemberProperty</code>	zero-or-one	True	Boolean	n/a	n/a	If set to true, this indicates that the property is a membership property, as described in the <a href="#">Query Syntax Specification: Member List Patterns</a> . This is useful when the resource whose shape is being defined is viewed as a container of other resources. For example, look at the last example in Appendix B's <a href="#">RDF/XML Representation Examples: Specifying the shape of a query result</a> , where <code>blog:comment</code> is defined as a membership property and comment that matches the query is returned as value of that property.
<code>oslc:name</code>	exactly-one	True	String	n/a	n/a	Name of property being defined, i.e. second part of property's Prefixed Name
<code>oslc:maxSize</code>	zero-or-one	True	Integer	n/a	n/a	For String properties

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<code>oslc:maxLength</code>	zero-or-one	True	Integer	n/a	n/a	For String properties only, specifies maximum characters allowed. If not set, then there is no maximum or maximum is specified elsewhere.
<code>oslc:occurs</code>	exactly-one	True	Resource	Reference	n/a	<b>MUST</b> be either <a href="http://open-services.net/ns/core#Exactly-one">http://open-services.net/ns/core#Exactly-one</a> (property is required), <a href="http://open-services.net/ns/core#Zero-or-one">http://open-services.net/ns/core#Zero-or-one</a> (property is optional), <a href="http://open-services.net/ns/core#Zero-or-many">http://open-services.net/ns/core#Zero-or-many</a> (property is optional), or <a href="http://open-services.net/ns/core#One-or-many">http://open-services.net/ns/core#One-or-many</a> (property is required)
<code>oslc:propertyDefinition</code>	exactly-one	True	Resource	Reference	n/a	URI of the property whose usage is being described.
<code>oslc:range</code>	zero-or-many	True	Resource	Reference	n/a	For properties with a resource value-type, Providers MAY also specify the range of possible resource types allowed, each specified by URI. The default range is <a href="http://open-services.net/ns/core#Resource">http://open-services.net/ns/core#Resource</a>

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<code>oslc:readOnly</code>	zero-or-one	True	Boolean	n/a	n/a	<p><code>true</code> if the property is read-only. If omitted, or set to <code>false</code>, then the property is writable. Providers <b>SHOULD</b> declare a property read-only when changes to the value of that property will not be accepted after the resource has been created, e.g. on PUT/PATCH requests. Consumers should note that the converse does not apply: Providers <b>MAY</b> reject a change to the value of a writable property.</p>
<code>oslc:representation</code>	zero-or-one	True	Resource	Reference	n/a	<p>Should be <a href="http://open-services.net/ns/core#Reference">http://open-services.net/ns/core#Reference</a>, <a href="http://open-services.net/ns/core#Inline">http://open-services.net/ns/core#Inline</a> or <a href="http://open-services.net/ns/core#Either">http://open-services.net/ns/core#Either</a></p>
<code>oslc:valueType</code>	zero-or-many	True	Resource	Reference	n/a	<p>See below for list of allowed values for <code>oslc:valueType</code>. If this property is omitted, then the value type is unconstrained.</p>



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oslc:valueType	zero-or-many	True	Resource	Reference	n/a	See below for list of allowed values for <code>oslc:valueType</code> . If this property is omitted, then the value type is unconstrained.
oslc:valueShape	zero-or-one	True	Resource	Reference	oslc:ResourceShape	if the value-type is a resource type, then Property <b>MAY</b> provide a shape value to indicate the Resource Shape that applies to the resource.

Allowed values for `oslc:valueType`:

- **Literal value-types**
  - **Boolean** - <http://www.w3.org/2001/XMLSchema#boolean>
  - **DateTime** - <http://www.w3.org/2001/XMLSchema#dateTime>
  - **Decimal** - <http://www.w3.org/2001/XMLSchema#decimal>
  - **Double** - <http://www.w3.org/2001/XMLSchema#double>
  - **Float** - <http://www.w3.org/2001/XMLSchema#float>
  - **Integer** - <http://www.w3.org/2001/XMLSchema#integer>
  - **String** - <http://www.w3.org/2001/XMLSchema#string>
  - **XMLLiteral** - <http://www.w3.org/1999/02/22-rdf-syntax-ns#XMLLiteral>
- **Resource value-types**
  - **Resource** - <http://open-services.net/ns/core#Resource>
  - **Local Resource** - <http://open-services.net/ns/core#LocalResource>
  - **Either Resource or Local Resource** - <http://open-services.net/ns/core#AnyResource>



# SPARQL semantics

- It is natural to define the semantics of Resource Shape constraints using SPARQL ASK
  - Assertions should return TRUE
  - Exceptions should return FALSE
  - If a constraint is violated, it is also useful to have a SPARQL query that returns the reason
- Some constraints implicitly refer to other graphs
  - Operation post-conditions refer to the “after” graph
  - Range constraints may refer to remote resources, e.g. asserting their type

# SPARQL assertion for: oslc:occurs oslc:Zero-or-one

prefix oslc\_cm: <http://open-services.net/ns/cm#>

ASK

```
{  
  {  
    select ?resource  
    where {  
      ?resource a oslc_cm:ChangeRequest.  
      ?resource oslc_cm:status ?status  
    }  
    group by ?resource  
    having (count(?status) <= 1)  
  }  
}
```

# SPARQL exception for: oslc:occurs oslc:Exactly-one

```
prefix oslc_cm: <http://open-services.net/ns/cm#>
```

```
ASK
```

```
{
```

```
  ?resource a oslc_cm:ChangeRequest.
```

```
  ?resource oslc_cm:status ?status1.
```

```
  ?resource oslc_cm:status ?status2.
```

```
  FILTER (?status1 != ?status2)
```

```
}
```

# Summary

- OSLC Resource Shape is a high-level RDF vocabulary for describing commonly occurring constraints on RDF graphs
  - NOT a full constraint language
- Motivated by REST API documentation and tool metadata use cases (query, creation)
- Expressible as SPARQL Ask queries
- In production use at OSLC