



## ***CHARMe node Interface Control Document***



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## Document Control

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0.6	A.Wilson	23 <sup>rd</sup> March	Remove stable and invalid graphs

		2017	Add more diagrams
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## Namespaces Used

Prefix	Namespace	Description
cito	<a href="http://purl.org/spar/cito/">http://purl.org/spar/cito/</a>	Citation Typing Ontology
cnt	<a href="http://www.w3.org/2011/content#">http://www.w3.org/2011/content#</a>	Representing Content in RDF
dc	<a href="http://purl.org/dc/elements/1.1/">http://purl.org/dc/elements/1.1/</a>	Dublin Core
dcterms	<a href="http://purl.org/dc/terms/">http://purl.org/dc/terms/</a>	Dublin Core Terms
dctypes	<a href="http://purl.org/dc/dcmitype/">http://purl.org/dc/dcmitype/</a>	Dublin Core Metadata Initiative
fabio	<a href="http://purl.org/spar/fabio/">http://purl.org/spar/fabio/</a>	FRBR-aligned Bibliographic Ontology
foaf	<a href="http://xmlns.com/foaf/0.1/">http://xmlns.com/foaf/0.1/</a>	The Friend of a Friend namespace
oa	<a href="http://www.w3.org/ns/oa#">http://www.w3.org/ns/oa#</a>	The Open Annotation ontology
prov	<a href="http://www.w3.org/ns/prov#">http://www.w3.org/ns/prov#</a>	The PROV namespace
skos	<a href="http://www.w3.org/2004/02/skos/core#">http://www.w3.org/2004/02/skos/core#</a>	Simple Knowledge Organization System Namespace Document
rdf	<a href="http://www.w3.org/1999/02/22/22-rdf-syntax-ns#">http://www.w3.org/1999/02/22/22-rdf-syntax-ns#</a>	The RDF namespace
xsd	<a href="http://www.w3.org/2001/XMLSchema#">http://www.w3.org/2001/XMLSchema#</a>	XML Schema namespace

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## 1 Node Services

These are values the the client should send, i.e. Content-Type shows the values that are accepted by the service from the client.

The following details calls that can be made to the node including headers that must be included in the call from the client.

- *advance\_status*  
Action: Changes an annotation state  
HTTP Method: POST  
HTTP Content-Type: [application/ld+json]  
Parameters:
  - *annotation* – annotation\_id
  - *toState* – ['submitted'|'retired']
- *data/(w+)?(format=[xml,turtle,json-ld], depth=[int])*  
Action: Returns an RDF description of the node resource associated with a given ID  
HTTP Method: GET  
HTTP Accept: [application/rdf+xml, text/turtle, application/ld+json]  
Parameters:
  - *format* – the mime format of the HTTP Response. This parameter overrides any HTTP Accept
  - *depth* – an integer greater or equal to zero. Limit the details in the triple description
- *index/[submitted|retired]?(format=[xml,turtle,json-ld])*  
Action: Returns the annotation nodes in the specific named graph  
HTTP Method: GET  
HTTP Accept: [application/rdf+xml, text/turtle, application/ld+json, text/html]  
Parameters:
  - *format* – the mime format of the HTTP Response. This parameter overrides any HTTP Accept
- *insert/annotation*  
Action: Inserts a RDF complaint document in the *submitted* graph. Provenance data about the user is added to the annotation.  
HTTP Method: POST  
HTTP Content-Type: [application/rdf+xml, text/turtle, application/ld+json]  
HTTP Accept: [text/plain]  
Returns the URI of the new annotation
- *modify/annotation*  
Action: Move the current annotation to *retired* graph and then insert the RDF complaint document in the *submitted* graph. Provenance data about the user is added to the annotation



and links are created between the submitted and retired annotations.

HTTP Method: POST

HTTP Content-Type: [application/rdf+xml, text/turtle, application/ld+json]

HTTPAccept: [text/plain]

Returns the URI of the new annotation

- *page/(w+)*

Action: Returns an RDF description of the node resource associated with a given ID

HTTP Method: GET

HTTP Accept: [text/html]

- *resource/(w+)?(format=[xml,turtle,json-ld], depth=[int])*

Action: Returns an RDF description of the node resource associated with a given ID

HTTP Method: GET

HTTP Accept: [application/rdf+xml, text/turtle, application/ld+json, text/html]

Parameters:

- *format* – the mime format of the HTTP Response. This parameter overrides any HTTP Accept
- *depth* – an integer greater or equal to zero. Limit the details in the triple description

- *resource/(w+)*

Action: Moves the resource to the 'retired' graph

HTTP Method: DELETE

- *resource/(w+)/reporttomoderator/*

Action: Email the registered admin for the site where the annotation originated. Include the OPTIONAL content of the PUT in the email. This should be used to explain why this annotation is being reported.

HTTP Method: PUT

HTTP Content-Type: [text/plain]

- *search/description*

Action: Returns an XML document describing the implemented OpenSearch

HTTP Method: GET

- *search/[atom]?*

*count={count?}&startPage={startPage?}&startIndex={startIndex?}&bodyType={a0:type?}&citingType={a1:Resource?}&comment={a2:chars?}&creatorFamilyName={a3:familyName?}&creatorGivenName={a3:givenName?}&dataType={a1:Resource?}&domainOfInterest={a4:SemanticTag?}&motivation={a4:Motivation?}&organization={a3:name?}&status={a5:status?}&target={a1:Resource?}&title={a6:title?}&userName={a3:accountName?}&depth={a5:depth?}&format={a5:format?}&sortKeys={a5:sortKeys}*

Action: Searches inside the Annotations

HTTP Method: GET

Parameters:

- *count* – the number of search results per page desired by the search client, default 10
- *startIndex* – the index of the first search result desired by the search client
- *startPage* – the page number of the set of search results desired by the search client
- *bodyType* – a URI of a *rdfs:Resource* of an annotation body
- *citingType* – a URI of a *rdfs:Resource* of an object citing a target
- *comment* – text to search inside the *cnt:chars* element of a body entity
- *creatorFamilyName* – the family name of the creator of an annotation. This performs a case insensitive search.
- *creatorGivenName* – the given name of the creator of an annotation. This performs a case insensitive search.
- *dataType* – a URI of a *rdfs:Resource* of an annotation target
- *domainOfInterest* – a URI of an *oa:SemanticTag* for a domain of interest
- *motivation* – a URI of an *oa:Motivation* for creating an annotation
- *organization* – a URI of an organization from where a client created an annotation
- *target* – a URI of a target of an annotation
- *title* – text to search inside the *dcterms:title* element of a citing entity
- *userName* – the user name of the creator of an annotation
- *status* – ['submitted'|'retired'], default submitted
- *depth* – an integer greater or equal to zero. Limit the details in the triple description
- *format* – the format of the returned elements ['json-ld'|'turtle'|'xml']
- *sortKeys* – a space separated list of sort keys, where a sort key is a comma separated list of key name ['annotatedAt'|'bodyType'|'citingType'|'dataType'|'creatorFamilyName'|'creatorGivenName'|'dataType'|'domainOfInterest'|'motivation'|'organization'|'target'|'userName'] and direction of sorting ['ASC'|'DESC']

- *suggest/[atom]?*

*{count?}&startPage={startPage?}&startIndex={startIndex?}&q={searchTerms?}&bodyType={a0:type?}&citingType={a0:type?}&comment={a1:chars?}&creatorFamilyName={a2:familyName?}&creatorGivenName={a2:givenName?}&dataType={a0:type?}&domainOfInterest={a3:domainOfInterest?}&motivation={a3:motivation?}&organization={a2:name?}&status={a3:status?}&target={a3:target?}&title={a4:title?}&userName={a2:accountName?}&depth={a3:depth?}&format={a3:format?}*

Action: Searches for the values of one or more of the searchTerms. These can be restricted by providing parameter values.

HTTP Method: GET

Parameters:

- *count* – the number of search results per page desired by the search client, default 10
- *startIndex* – the index of the first search result desired by the search client

- *startPage* – the page number of the set of search results desired by the search client
  - *q* – a space separated list from:  
[*'bodyType'* | *'citingType'* | *'dataType'* | *'domainOfInterest'* | *'motivation'* | *'organization'* | *'\**]
  - *bodyType* – a URI of a *rdfs:Resource* of an annotation body
  - *citingType* – a URI of a *rdfs:Resource* of an object citing a target
  - *comment* – text to search inside the *cnt:chars* element of a body entity
  - *creatorFamilyName* – the family name of the creator of an annotation. This performs a case insensitive search.
  - *creatorGivenName* – the given name of the creator of an annotation. This performs a case insensitive search.
  - *dataType* – a URI of a *rdfs:Resource* of an annotation target
  - *domainOfInterest* – a URI of an *oa:SemanticTag* for a domain of interest
  - *motivation* – a URI of an *oa:Motivation* for creating an annotation
  - *organization* – a URI of an organization from where a client created an annotation
  - *target* – a URI of a target of an annotation
  - *title* – text to search inside the *dcterms:title* element of a citing entity
  - *userName* – the user name of the creator of an annotation
  - *status* – [*'submitted'* | *'retired'*], default *submitted*
  - *depth* – an integer greater or equal to zero. Limit the details in the triple description
  - *format* – the format of the returned elements [*'json-ld'* | *'turtle'* | *'xml'*]
- *sparql*  
Implements the SPARQL read only endpoint
  - *sparql.html*  
The FUSEKI read only GUI
  - *user/following/*  
Action: List the resources that the current user is following.  
HTTP Method: GET  
HTTP Accept: [*application/ld+json*, *text/html*]
  - *user/following/<resource\_uri>*  
Action: Follow the resource. Email notifications will be sent if any annotations, containing the resource as a target, are created modified or deleted.  
HTTP Method: PUT
  - *user/following/<resource\_uri>*  
Action: Stop following the resource.  
HTTP Method: DELETE
  - *version*  
Action: Returns the version of the server

HTTP Method: GET  
HTTP Accept: [text/plain]

- *vocab*

Action: Returns an RDF description of the CHARMe vocabulary  
HTTP Method: GET  
HTTP Accept: [application/rdf+xml, text/turtle, application/ld+json, text/html]

## 2 Creating Annotations

A CHARMe annotation is based on the OpenAnnotation (OA) specifications. As consequence any client implementation is responsible for assembling the annotation according to the OA documentation.

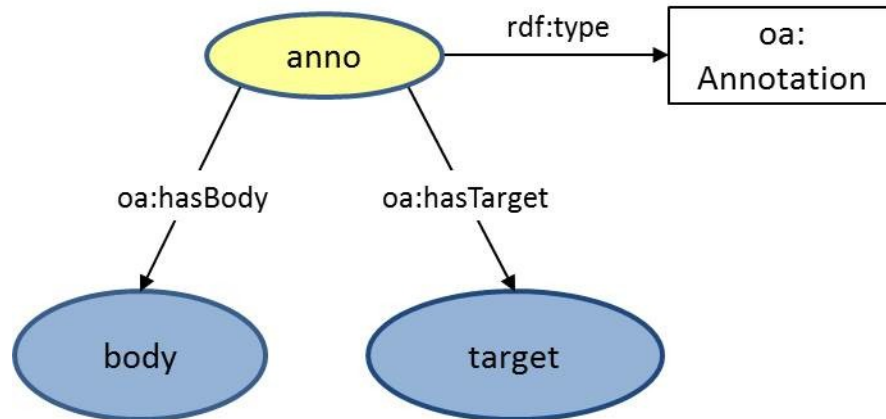


Figure 1: Open Annotation

### 2.1 Using AnnoId And BodyId To Create Annotations

The CHARMe node is responsible for creating URIs for annotations and resolving them to specific resources. To achieve this, the submitted annotation should make use of key words in the annotation that will be converted to URIs by the CHARMe node during the ingest process. An annotation written in Turtle should have the general format:

```
@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .

<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <anyTargetURI> ;
  oa:hasBody <chnode:bodyID> .

<chnode:bodyID> a someClass ;
  [body properties...] .
```

Figure 2: The use of annoID and bodyID

Where **annoID** is mandatory and **bodyID** is optional. The OA specification states that an annotation may contain multiple bodies, however when inserting a new annotation to the CHARMe node it should have zero or one body marked as bodyID. Additional bodies may be included provided they reference existing URIs, either internal or external to the node.

The **http://localhost/** reference will also be automatically replaced by the node with its own URL.

### 2.2 Provenance and Other Annotation Metadata

Clients MUST provide the motivation for the annotation (oa:motivatedBy), the serialization time stamp (oa:serializedAt) and information about the software agent that created or updated the annotation (oa:serializedBy). An annotation can either point to an existing agent or a client can create a new

one. If creating a new agent it MUST include the type `prov:SoftwareAgent` and `foaf:name`. For example:

```
@prefix chnode: <http://localhost/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix oa: <http://www.w3.org/ns/oa#> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

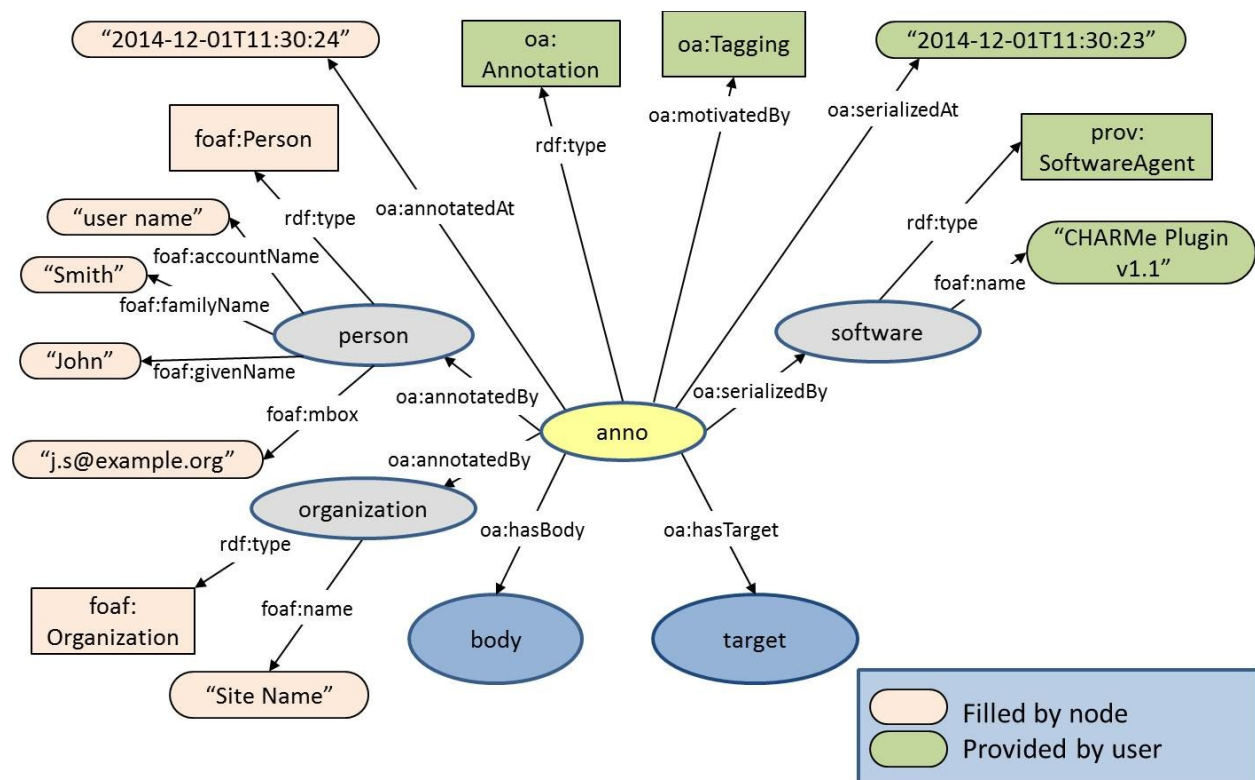
<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <anyTargetURI> ;
  oa:motivatedBy oa:tagging ;
  oa:serializedAt "2014-06-13T23:29:49.729746"^^xsd:dateTime ;
  oa:serializedBy <chnode:agentID> .

<chnode:agentID> a prov:SoftwareAgent ;
  foaf:name "CURL" .
```

**Figure 3: Software Agent Provenance Data**

Where **agentID** is substituted by the node during ingest.

When a new annotation is submitted the node adds additional provenance data, which is based on the token used for the insert. The node creates a new `foaf:Person` object which contains the user name (`foaf:accountName`), family name (`foaf:familyName`) and given name (`foaf:givenName`). The node also attaches a time stamp (`oa:annotatedAt`) to the annotation.



**Figure 4: Provenance Data**

All URIs in the submitted annotation MUST be URL encoded, see [percent-encoding](#).

## 2.3 Using TargetID To Create Composite Targets

The use of **targetID**, which will get substituted by the node during ingest, will create a target resource. However its use is restricted to targets of type `oa:Composite` and `charme:DatasetSubset`.

```
@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .

<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <chnode:targetID> .

<chnode:targetID> a oa:Composite ;
  oa:item <http://example.edu/target/01> ;
  oa:item <http://example.edu/target/02> .
```

Figure 5: The use of targetID for Composite

## 2.4 Tags For Fine Grained Commentary

A number of tags have been introduced for use by fine grained commentary. The **targetID** should be used for the DatasetSubset. **subsetSelectorID** should be used for the subsetSelector. The following tags represent multivalued resources, **spatialExtentID**, **temporalExtentID**, **variableID**, **verticalExtentID**. Each of these tags may have a prefix in order to distinguish the same instance of a resource, i.e. `spatialExtentID-01`, `spatialExtentID-02`.

```
@prefix charme: <http://purl.org/voc/charme#> .
@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .

<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <chnode:targetID> .

<chnode:targetID> a charme:DatasetSubset ;
  oa:hasSelector <chnode:subsetSelectorID> .

<chnode:subsetSelectorID> a charme:SubsetSelector ;
  charme:hasSpatialExtent <chnode:spatialExtentID-01> ;
  charme:hasSpatialExtent <chnode:spatialExtentID-02> ;
  charme:hasVariable <chnode:variableID-01> ;
  charme:hasVariable <chnode:variableID-02> .

<chnode:spatialExtentID-01> a charme:SpatialExtent .
<chnode:spatialExtentID-02> a charme:SpatialExtent .

<chnode:variableID-01> a charme:Variable .
<chnode:variableID-02> a charme:Variable .
```

Figure 6: Fine Grained Commentary

## 3 OA Examples

### 3.1 Text-based Annotations

This is the simple case where a user writes a free text comment about a given target. The text is created and attached as a new annotation body. Unstructured plain text is stored as `cnt:ContentAsText`. Structured content is also possible via `cnt:ContentAsXML` for representing for example XHTML.

```
@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix cnt: <http://www.w3.org/2011/content#> .
@prefix dctype: <http://purl.org/dc/dcmitype/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <http://example.edu/target/01> ;
  oa:hasBody <chnode:bodyID> ;
  oa:motivatedBy oa:commenting ;
  oa:serializedAt "2014-06-13T23:29:49.729746"^^xsd:dateTime ;
  oa:serializedBy <chnode:agentID> .

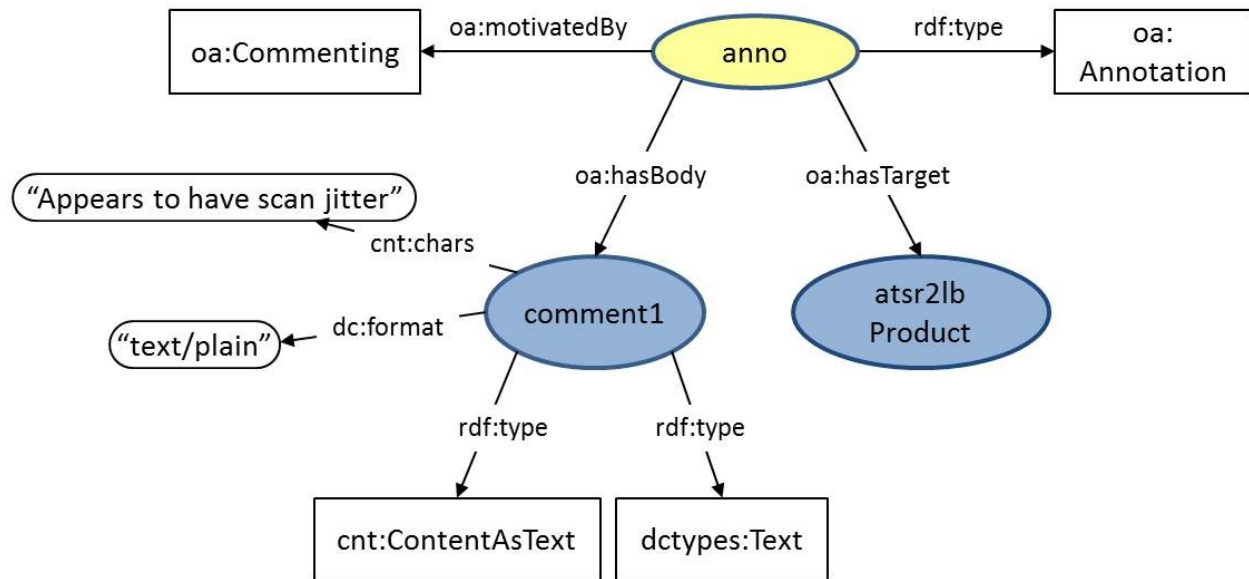
<chnode:agentID> a prov:SoftwareAgent ;
  foaf:name "CURL" .

<http://example.edu/target/01> a dctype:Text ;
  dc:format "html/text" .

<chnode:bodyID> a cnt:ContentAsText, dctype:Text ;
  cnt:chars "hello there!" ;
  dc:format "text/plain" .
```

Figure 7: A Text Annotation





**Figure 8: A Text Annotation**

In the next example the body refers to an external resource consequently the client does not need a **bodyID**.

```
@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix cnt: <http://www.w3.org/2011/content#> .
@prefix dctypes: <http://purl.org/dc/dcmitype/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <http://example.edu/target/01> ;
  oa:hasBody <http:example.edu/onepage> ;
  oa:motivatedBy oa:commenting ;
  oa:serializedAt "2014-06-13T23:29:49.729746"^^xsd:dateTime ;
  oa:serializedBy <chnode:agentID> .

<chnode:agentID> a prov:SoftwareAgent ;
  foaf:name "CURL" .

<http://example.edu/target/01> a dctypes:Text ;
  dc:format "html/text" .

<http:example.edu/onepage> a dctypes:Text ;
  dc:format "html/text" .
```

**Figure 9: An Annotation with an External Body**

## 3.2 Multiple Bodies

This situation may happen when the user wants to refer multiple notes to a single target; in this case is assumed that the user wants to insert zero or one textual while using older/external references for the other bodies.

## 3.3 Empty Body

This situation may happen when the user wants to simply generate a “bookmark” and update it later.

## 3.4 Multiple Targets

The body is considered to be equally related to each target individually, rather than the complete set of targets. This construction may be used so long as dropping any of the targets would not invalidate the annotation's meaning<sup>1</sup>.

```
@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix cnt: <http://www.w3.org/2011/content#> .
@prefix dctype: <http://purl.org/dc/dcmitype/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <http://example.edu/target/01> ;
  oa:hasTarget <http://example.edu/target/02> ;
  oa:hasBody <chnode:bodyID> ;
  oa:motivatedBy oa:commenting ;
  oa:serializedAt "2014-06-13T23:29:49.729746"^^xsd:dateTime ;
  oa:serializedBy <chnode:agentID> .

<chnode:agentID> a prov:SoftwareAgent ;
  foaf:name "CURL" .

<http://example.edu/target/01> a dctype:Text ;
  dc:format "html/text" .

<http://example.edu/target/02> a dctype:Text ;
  dc:format "html/text" .

<chnode:bodyID> a cnt:ContentAsText, dctype:Text ;
  cnt:chars "hello there!" ;
  dc:format "text/plain" .
```

Figure 10: An Annotation with Multiple Targets

---

1 <http://www.openannotation.org/spec/core/core.html#MultipleBodyTarget>

### 3.5 Composite Targets

Composite is a multiplicity construct that conveys that all of the constituent resources are required for the annotation to be correctly interpreted. There **MUST** be two or more item relationships (`oa:item`) for each composite (`oa:Composite`).

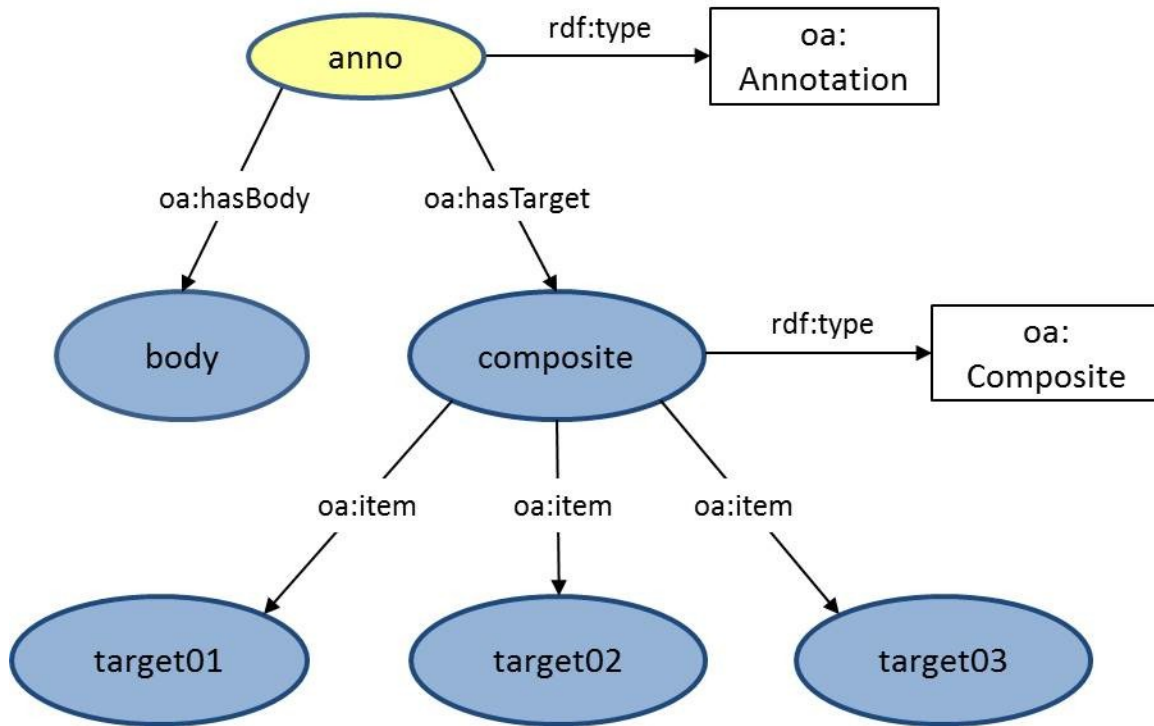


Figure 11: An Annotation with a Composite Target

In order to allow the creation of composite resources for a target, a target resource needs to be created. To create a composite resource as a target use **targetID**, which will get substituted by the node during ingest.

```
@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .

<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <chnode:targetID> .

<chnode:targetID> a oa:Composite ;
  oa:item <http://example.edu/target/01> ;
  oa:item <http://example.edu/target/02> .
```

Figure 12: An Annotation with a Composite Target

### 3.6 Other Formats

Figures 5 and 6 show the JSON-LD and XML-RDF representations of the Turtle from figure 3.

```

json-ld
{
  "@graph": [
    {
      "@id": "http://localhost/annoID",
      "@type": [
        "http://www.w3.org/ns/oa#Annotation"
      ],
      "http://www.w3.org/ns/oa#hasBody": [
        {
          "@id": "http://localhost/bodyID"
        }
      ],
      "http://www.w3.org/ns/oa#hasTarget": [
        {
          "@id": "http://example.edu/target/01"
        }
      ],
      "http://www.w3.org/ns/oa#motivatedBy": [
        {
          "@id": "http://www.w3.org/ns/oa#commenting"
        }
      ],
      "http://www.w3.org/ns/oa#serializedAt": [
        {
          "@value": "2014-06-13T23:29:49.729746^^xsd:dateTime"
        }
      ],
      "http://www.w3.org/ns/oa#serializedBy": [
        {
          "@id": "http://localhost/agentID"
        }
      ]
    },
    {
      "@id": "http://localhost/agentID",
      "@type": [
        "http://www.w3.org/ns/prov#SoftwareAgent"
      ],
      "http://xmlns.com/foaf/0.1/name": [
        {
          "@value": "CURL"
        }
      ]
    },
    {
      "@id": "http://example.edu/target/01",
      "@type": [
        "http://purl.org/dc/dcmitype/Text"
      ],
      "http://purl.org/dc/elements/1.1/format": [
        {
          "@value": "html/plain"
        }
      ]
    },
    {
      "@id": "http://localhost/bodyID",
      "@type": [
        "http://www.w3.org/2011/content#ContentAsText",
        "http://purl.org/dc/dcmitype/Text"
      ],
      "http://purl.org/dc/elements/1.1/format": [
        {
          "@value": "text/plain"
        }
      ],
      "http://www.w3.org/2011/content#chars": [
        {
          "@value": "hello there!"
        }
      ]
    }
  ]
}

```

**Figure 13: A JSON-LD Representation of a Text Annotation**

```

xml-rdf
<rdf:RDF
  xmlns:ns1="http://www.w3.org/ns/oa#"
  xmlns:ns2="http://purl.org/dc/elements/1.1/"
  xmlns:ns3="http://www.w3.org/2011/content#"
  xmlns:ns4="http://xmlns.com/foaf/0.1/"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">

  <rdf:Description rdf:about="http://localhost/annoID">
    <rdf:type rdf:resource="http://www.w3.org/ns/oa#Annotation"/>
    <ns1:hasTarget rdf:resource="http://example.edu/target/01"/>
    <ns1:hasBody rdf:resource="http://localhost/bodyID"/>
    <ns1:motivatedBy rdf:resource="http://www.w3.org/ns/oa#:commenting"/>
    <ns1:serializedAt>2014-06-13T23:29:49.729746^^xsd:dateTime</ns1:serializedAt>
    <ns1:serializedBy rdf:resource="http://localhost/agentID"/>
  </rdf:Description>

  <rdf:Description rdf:about="http://localhost/agentID">
    <rdf:type rdf:resource="http://www.w3.org/ns/prov#SoftwareAgent"/>
    <ns4:name>CURL</ns4:name>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.edu/target/01">
    <rdf:type rdf:resource="http://purl.org/dc/dcmitype/Text"/>
    <ns2:format>html/text</ns2:format>
  </rdf:Description>

  <rdf:Description rdf:about="http://localhost/bodyID">
    <rdf:type rdf:resource="http://purl.org/dc/dcmitype/Text"/>
    <rdf:type rdf:resource="http://www.w3.org/2011/content#ContentAsText"/>
    <ns2:format>text/plain</ns2:format>
    <ns3:chars>hello there!</ns3:chars>
  </rdf:Description>

</rdf:RDF>

```

**Figure 14: A XML-RDF Representation of a Text Annotation**

### 3.7 Tagging A Dataset

Classification of annotations is an important capability primarily to enable users to later discovery information under related thematic areas. OA provides a means to do so via *tagging*. In this case, an annotation is set with the `oa:tagging` motivation. The body of the annotation contains the actual tag. A tag may be a simple text-based keyword or a semantic tag, a URI relating to a concept from a vocabulary. Using the OA semantic tags feature allows annotations to be classified with concepts from SKOS collections. Using the NERC Vocabulary Server<sup>2</sup> it is possible to map classification terms from one vocabulary to similar concepts in other vocabularies.

When inserting a semantic tag the client **MUST** use the URI of the term as the URI of the body. The body **MUST** have a type of `oa:SemanticTag` and **SHOULD** have a `skos:prefLabel`. The label is for the benefit of faceted searches.

```
@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .
@prefix dctype: <http://purl.org/dc/dcmitype/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <http://example.edu/dataset/01> ;
  oa:hasBody <http://example.edu/term/01> ;
  oa:motivatedBy oa:tagging ;
  oa:serializedAt "2014-06-13T23:29:49.729746"^^xsd:dateTime ;
  oa:serializedBy <chnode:agentID> .

<chnode:agentID> a prov:SoftwareAgent ;
  foaf:name "CURL" .

<http://example.edu/dataset/01> a dctype:Dataset .

<http://example.edu/term/01> a oa:SemanticTag ;
  skos:prefLabel "Atmospheric conditions" .
```

Figure 15: A Semantic Tag Annotation

---

2 <http://vocab.nerc.ac.uk/>

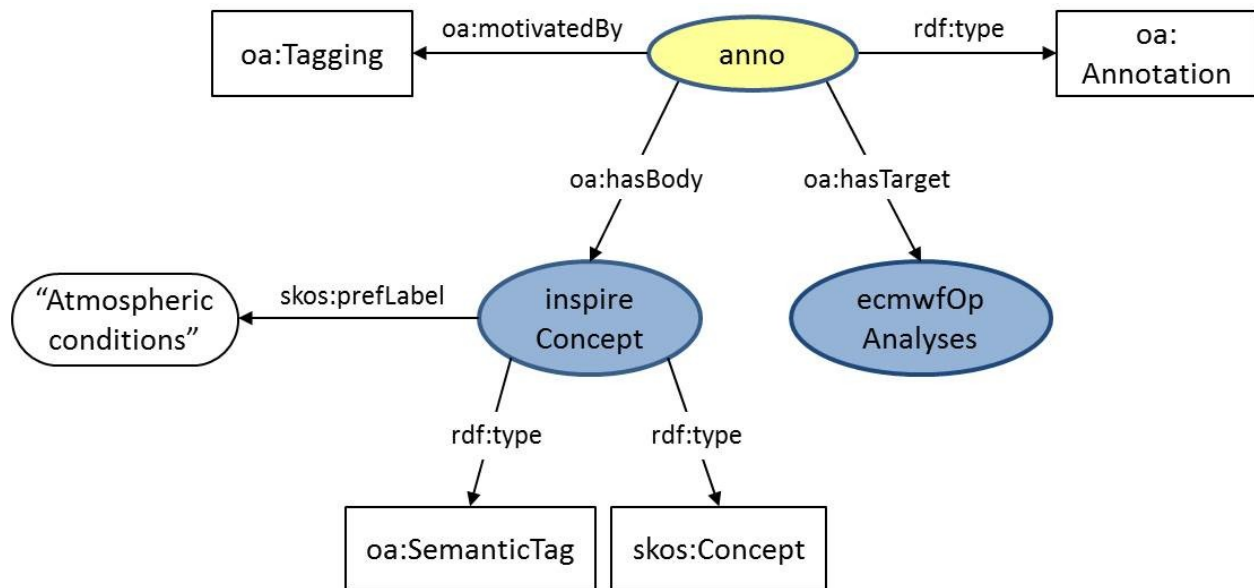


Figure 16: A Semantic Tag Annotation

### 3.8 Linking Datasets

It can often be the case that datasets are somehow related to each other. OA provides a means to associate objects via *linking*. In this case, an annotation is set with the `oa:linking` motivation. Both the body and target are URIs of the datasets.

```
@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .
@prefix dctype: <http://purl.org/dc/dcmitype/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<chnode:annoID> a oa:Annotation ;
  oa:hasTarget <http://example.edu/dataset01> ;
  oa:hasBody <http://example.edu/dataset02> ;
  oa:motivatedBy oa:linking ;
  oa:serializedAt "2014-06-13T23:29:49.729746"^^xsd:dateTime ;
  oa:serializedBy <chnode:agentID> .

<chnode:agentID> a prov:SoftwareAgent ;
  foaf:name "CURL" .

<http://example.edu/dataset01> a dctype:Dataset .
<http://example.edu/dataset02> a dctype:Dataset .
```

Figure 17: Linked Datasets Annotation

### 3.9 Citation

This differs from the other examples in the fact that it makes use of the CiTO ontology to create a `CitationAct` and then uses Open Annotation to comment on the citation. The `CitationAct` links the cited and citing entities and the annotation comments on the `CitationAct`.

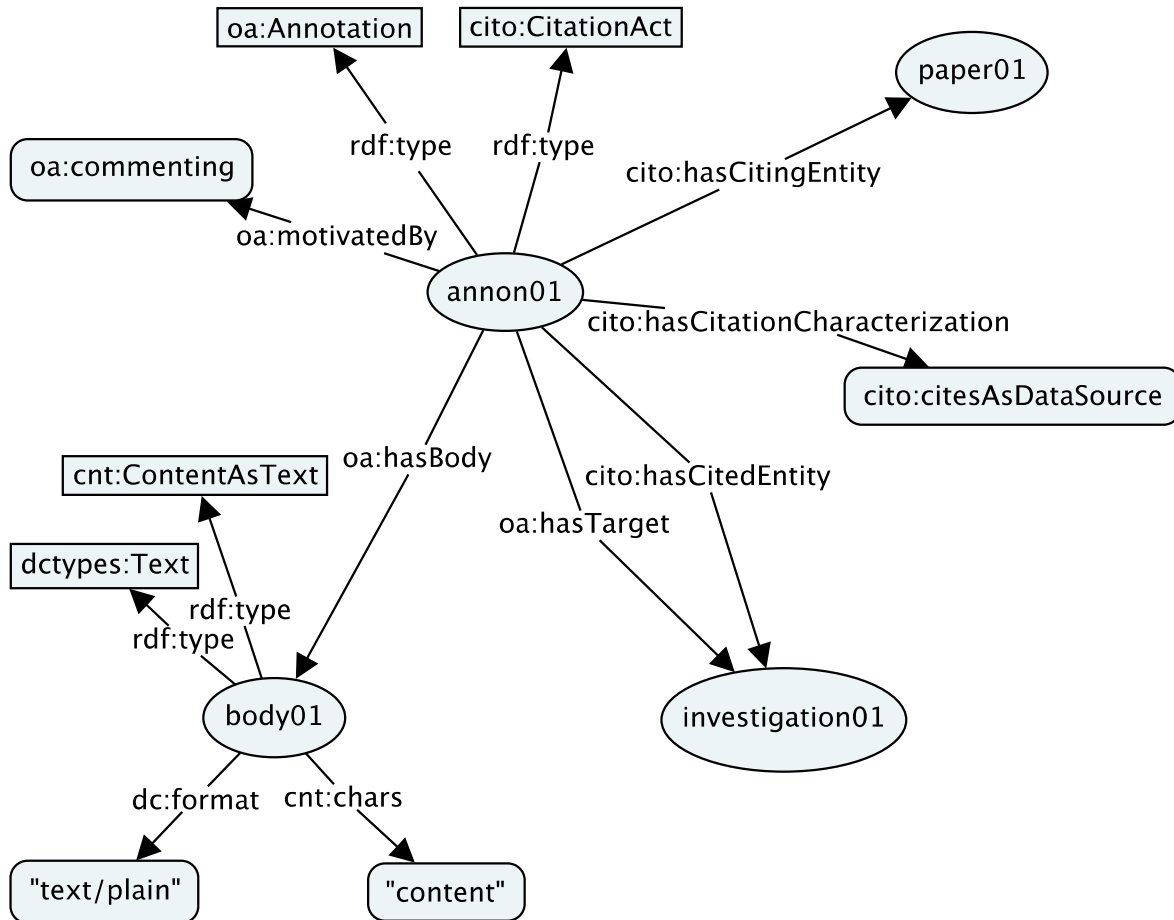


Figure 18: Citing a Dataset and adding a Comment



```

@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix cnt: <http://www.w3.org/2011/content#> .
@prefix cito: <http://purl.org/spar/cito/> .
@prefix dcterms: <http://purl.org/dc/terms/> .
@prefix dctypes: <http://purl.org/dc/dcmitype/> .
@prefix fabio: <http://purl.org/spar/fabio/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<chnode:annoID> a oa:Annotation, cito:CitationAct ;
  oa:hasTarget <http://example.edu/dataset/01> ;
  oa:hasBody <chnode:bodyID> ;
  oa:motivatedBy oa:commenting ;
  oa:serializedAt "2014-06-13T23:29:49.729746"^^xsd:dateTime ;
  oa:serializedBy <chnode:agentID> ;
  cito:hasCitingEntity <doi://example.edu/paper/01> ;
  cito:hasCitedEntity <http://example.edu/dataset/01> ;
  cito:hasCitationCharacterization cito:citesAsDataSource .

<chnode:agentID> a prov:SoftwareAgent ;
  foaf:name "CURL" .

<http://example.edu/dataset/01> a dctypes:Dataset .

<chnode:bodyID> a cnt:ContentAsText, dctypes:Text ;
  cnt:chars "This dataset was cited because ..." ;
  dc:format "text/plain" .

<doi://example.edu/paper/01> a fabio:JournalArticle ;
  dcterms:title "My Journal Article" .

```

**Figure 19: An Annotation and Citation**

## 4 Calls in More Detail

### 4.1 Advance\_status

The advance\_status call can be used to change the status of an annotation. Possible states are 'submitted' and 'retired'. The state of 'retired' is considered to be a final state, once an annotation has one of this state then its state can no longer be changed.

If the requested is the same as the existing status it is not an error and has no effect, i.e. if an annotation has a status of 'submitted' and you try and update the status to 'submitted' then there will be no change to the underlying data and you will get a return code of 200.

A user can only update an annotation if they are associated with the annotation or they are a member of the 'moderator' group. Where being associated with an annotation means that one of the oa:annotatedBy foaf:Person objects attached to the annotation contains their username.

When an annotation is updated the annotation, and all of the triples with the annotation id as their subject, are moved to the graph for the selected state. The foaf:Person object(s) linked via oa:annotatedBy are unique so they are also moved. The foaf:Organization and prov:SoftwareAgent objects are not necessarily unique to that annotation so they are copied. New provenance data about the person requesting the status change is also written out and the oa:annotatedAt time is updated.

The call should be a POST and contain a json file, see example file below.

```
{
  "annotation": "https://charme-dev.cems.rl.ac.uk/resource/12bfcce3bfe4466e823eb87344ca88b7",
  "toState": "retired"
}
```

**Figure 20: Json File Used for the Call advance\_status**

It is possible to use curl to post the file, see example below.

```
curl -X POST 'https://charme-dev.cems.rl.ac.uk:8027/advance_status/' -d@advanceStatus.json
-H 'Authorization: Token 12345678901234567890123456789' -H 'Content-Type:
application/ld+json'
```

**Figure 21: Curl Used to Call advance\_status**

Possible HTTP return codes include:

200 – OK, the annotation was updated, or if the requested status was the same as the existing status nothing was changed

400 – User error, i.e. missing parameter from the json file or trying to change the status of an annotation that is already in a final state

403 – You do not have permission to change the status for this annotation

404 – No annotation was found for the given id

405 – Method not allowed, you did not use a POST request

500 – Oops, something has gone wrong with the server

## 4.2 Delete Annotation

The delete annotation call moves the annotation to the *retired* graph. A deleting activity is created and attached to the “deleted” annotation.

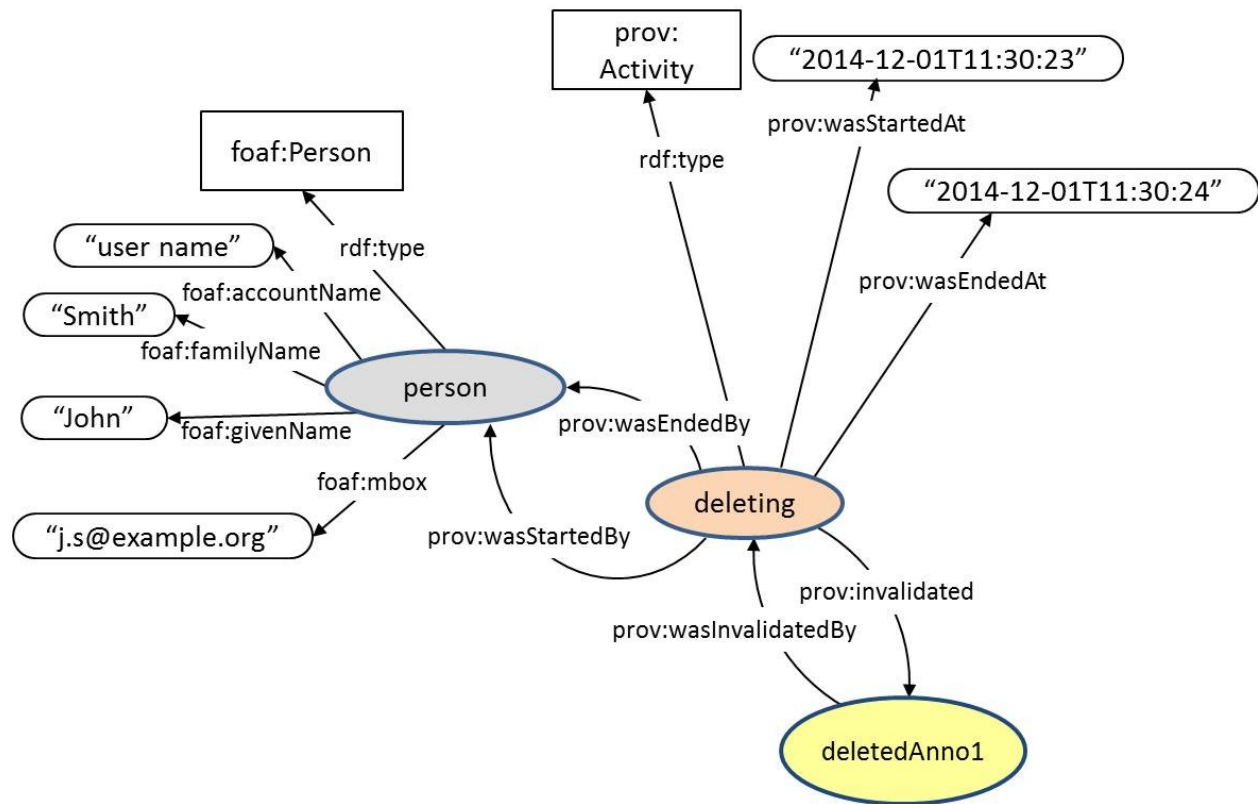
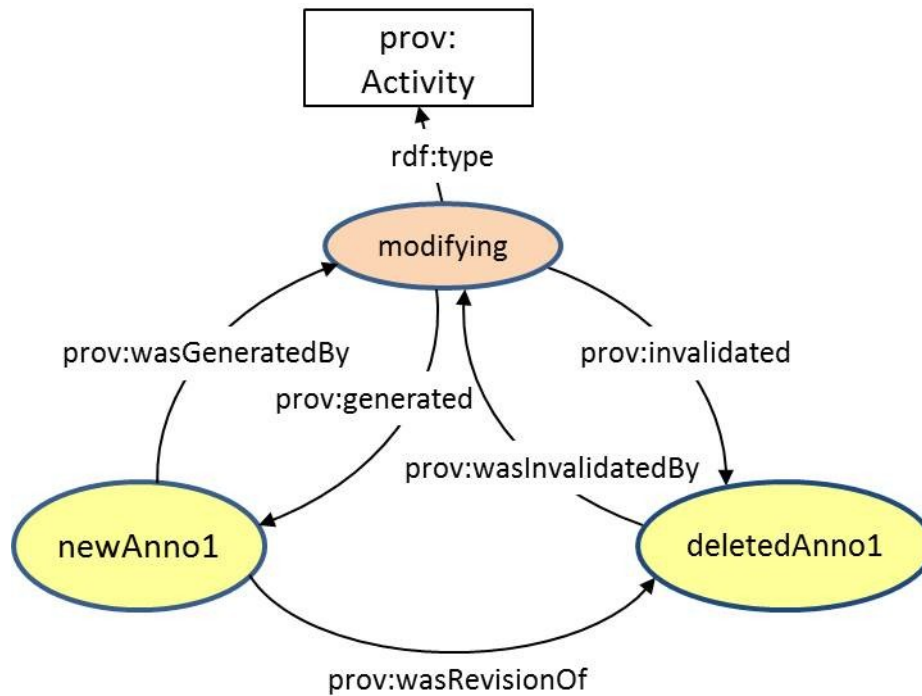


Figure 22: Deletion Metadata

## 4.3 Modify Annotation

The modify annotation call moves the current annotation to *retired* graph, as per the delete call, and then inserts the RDF complaint document in the *submitted* graph. Provenance data about the user is added to the annotation and links are created between the submitted and retired annotations.



**Figure 23: Links Between Submitted and Retired Annotations**

A user can only modify an annotation if they are associated with the annotation or they are a member of the 'moderator' group. Where being associated with an annotation means that one of the `oa:annotatedBy foaf:Person` objects attached to the annotation contains their username.

The call should be a POST and contain a `application/rdf+xml`, `text/turtle` or `application/ld+json` file, see example turtle file below.

```

@prefix chnode: <http://localhost/> .
@prefix oa: <http://www.w3.org/ns/oa#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix cnt: <http://www.w3.org/2011/content#> .
@prefix dctype: <http://purl.org/dc/dcmitype/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<https://charme-dev.cems.rl.ac.uk/resource/746819b6d8a34e82a693fb840dc99d16> a
oa:Annotation ;
    oa:hasTarget <http://example.edu/target/01> ;
    oa:hasBody <chnode:bodyID> ;
    oa:motivatedBy oa:commenting ;
    oa:serializedAt "2014-06-13T23:29:49.729746"^^xsd:dateTime ;
    oa:serializedBy <chnode:agentID> .

<chnode:agentID> a prov:SoftwareAgent ;
    foaf:name "CURL" .

<http://example.edu/target/01> a dctype:Text ;
    dc:format "html/text" .

<chnode:bodyID> a cnt:ContentAsText, dctype:Text ;
    cnt:chars "bye" ;
    dc:format "text/plain" .

```

**Figure 24: Modify An Annotation**

The URI of the new annotation is returned.

## 5 Open Search

### 5.1 Description Document

`search/description` returns an XML document describing the implemented OpenSearch

### 5.2 Search

The search will search the graph specified by the value of `status`, if no value is specified for `status` then the 'submitted' graph will be used. The search results are filtered based on the values of the parameters:

- `bodyType`
- `citingType`
- `creatorFamilyName`
- `creatorGivenName`
- `dataType`
- `domainOfInterest`
- `motivation`
- `organization`
- `target`
- `userName`

If more than one parameter type is provided, i.e. `dataType=1&domainOfInterest=2`, then the results must match both parameters.

Additionally the number of results and paging can be controlled using:

- `count`
- `startIndex`
- `startPage`

By default the results are sorted by the time of the creation of the annotation, `annotatedAt`. By use of the `sortKeys` parameter it is possible to change the sorting order. The `sortKeys` takes a space separated list of sort keys, where a sort key is a comma separated list of key name [`'annotatedAt'` `'bodyType'` `'citingType'` `'dataType'` `'creatorFamilyName'` `'creatorGivenName'` `'domainOfInterest'` `'motivation'` `'organization'` `'target'` `'userName'`] and direction of sorting [`'ASC'` `'DESC'`]. If omitted the direction of sorting defaults to `DESC`.

`&sortKeys=bodyType,ASC motivation`

#### 5.2.1 Examples

`search/atom?count=20&status=submitted&depth=0&format=turtle`

`search/atom?count=5&dataType=http://purl.org/dc/dcmitype/Dataset&  
domainOfInterest=http://vocab.ndg.nerc.ac.uk/term/P220/1/26&status=submitted`

### 5.3 Suggest

The suggest will return all of the values for the given search terms from the graph specified by the value of `status`. The search terms are specified via the `q` parameter, allowed values are:

- bodyType
- citingType
- dataType
- domainOfInterest
- motivation
- organization
- \*

The value for q can be a space separated list e.g. q={dataType motivation}.

The results include the URI and preferred label for each term. The results can be restricted by using values for the parameters listed in 4.2.

**N.B.** The totalResults refers to the number of different facets found. Currently the number of resources per facet is not reported.

### 5.3.1 Examples

suggest/atom?q={dataType motivation}&status=submitted

This will return a list of all of the data types and motivations that are in the submitted graph.

suggest/atom?

q={domainOfInterest}&dataType=http://purl.org/dc/dcmitype/Dataset&status=submitted

This will return a list of all of the domains of interest that are in the submitted graph where the annotations have a data type of http://purl.org/dc/dcmitype/Dataset.

## 6 CHARMe Vocabulary

The CHARMe vocabulary is available via the `/sparql` endpoint on the node and is contained in the graph <http://localhost:3333/privateds/data/vocab>. It is also available via the vocab endpoint.



## 7 Security

The Node security provides two components: the node administration and the client OAuth authentication.

The OAuth administration is responsible to grant access, to external client, to protected resources. The OAuth manages four tables accessible through the django admin

Django administration		
Site administration		
Auth		
Groups	 Add	 Change
Users	 Add	 Change
Oauth2		
Access tokens	 Add	 Change
Clients	 Add	 Change
Grants	 Add	 Change
Refresh tokens	 Add	 Change
Redirects		
Redirects	 Add	 Change
Sites		
Sites	 Add	 Change

**Illustration 7.1:**

To allow an already registered user to access a specific resource the Node admin insert a new record in the *Clients* table defining:

- the user authorized to the resource
- the RequiredURL the user want to access
- the URL where the user will be redirected if granted
- the Client ID used to identify the user:RequiredURL pair.

Django administration
Welcome, mnagni. Change password / Log out

Home > OAuth2 > Clients > http://localhost:8000/index/submitted

### Change client

History

User:

Name:

Url:
Currently: http://proteus.badc.rl.ac.uk:8000/add

Change:

Your application's URL.

Redirect uri:
Currently: http://localhost:8000/index/submitted

Change:

Your application's callback URL.

Client id:

Client secret:

Client type:
Public (Native and JS applications)

Delete
Save and add another
Save and continue editing
Save

**Illustration 7.2:**

In a typical request request a client requires an HTTP GET with the following parameters:

*?client\_id=1-2-3-4-5-6&response\_type=token&redirect\_uri=http://localhost:8000/index/submitted*

if the user is not authenticated the node requires user/password. Once authenticated the node returns an HTTP 302 conform to OAuth returning a *access token*, *expiration date*, *type* and *scope* similar to

*http://localhost:8000/index/submitted?  
access\_token=58412ba8bf8d225ed8617fda0806f41a3d1428d0&token\_type=Bearer&expires\_in=259199  
9&scope=add\_annotation*

Unfortunately it doesn't work as expected with ajax calls. For calls via XMLHttpRequest (XHR) transparent redirection works only for urls in the same domain ("[same origin](#)"). But proxy software returns 302-responses with urls in "Location" header from other domain ("cross-origin"). So when client code sends a GET-request via XHR (an ajax call) and the user agent gets a 302 response (from proxy) XHR fails the request. The result contains absolutely nothing that could help to identify the failure reason. In a jQuery's "fail" handler we'll get status: 0, responseText:"",statusText:"error".

That's very bad. A conclusion that we can make is that Single Page Applications can be incompatible with reverse proxy software.

One point in the HTTP spec can help here. It [states](#) that: So there should be no transparent redirections for POST requests. Our application on getting an error with status=0 can send a POST-request to its server. And the proxy software will not return 302 responses as it can (and will) be ignored by the user agent. Instead it'll return a 401 response asking the user agent to authenticate. So the user will be prompted for credentials and if they're ok the proxy will pass the original request and all subsequent ones. Application continues to work.