

Fulcrum Resource Notation (FRN)

Introduction

The Fulcrum Resource Notation (FRN) is a specialized type of [URI](#) notation used across Fulcrum services designed for unambiguous identification of various resources. We want the notation to be generic enough to be able to point to "anything" (= something that we cannot predict right now). At the same time we know our current system limitations and have to design for working with these limitations.

The FRN is used in [Organizer Service](#), [PSetService](#) and dependent components and applications involved in Trimble Connect, CDM and DiCtion use cases.

Specification

General format for FRN (Fulcrum Resource Notation):

```
<frn> = frn:<resType>:<resId>[/<resType>:<resId>[/...]][/<relation>]
```

Where

“frn:” is a prefix that allows to distinguish possible different notations, thus enabling the future extensions and changes.

<resType> - a string uniquely identifying type of the resource we are referring to. There is a dictionary of known types (see below).

<resId> - is a resource identifier with optional version id. The `resId` format is specific to the type of the resource. From this notation point of view this is just a string that allow the owner of the resource to locate it. Remember to apply url encoding if there are special characters (like '/' or '.').

<relation> - optional relation.

E.g. in case of model elements a so called "source id" must be used. This is a persistent id assigned by authoring app to the element when producing the model. Care should be taken that source id is not transformed in any way.

So if we are speaking about IFC model, the IFCGuid must be used as is.

In case of entities from BIM models this is an entity identifier. The entity identifier is a string representation of a guid, IfcGuid, spatial hash, dwg handle or any other type of identifier that is specific to the published model format.

Remember, since FRN is an URN, each segment in the FRN must be URL encoded (if it contains not url safe characters).

Hierarchical resources

The convention reflects the hierarchical structure of the resources and allows to benefit from prefix based filtering to find everything related to specific parent/container. In the future we might also use a [CURIE](#) type of notation that utilizes namespaces.

E.g. in case of BIM entities in some cases the model file the entity is published in is considered as a parent container, but this is optional. If model file as a container is specified then link refers to the entity in the specific file and can be easily found in that file. But in many cases the same entity (identified by unique id) can be found in several files. This case presents a challenge to consuming applications to locate those files, but this is out of the scope of this specification.

Limits

The length of individual link in FRN notation cannot be more than 512 characters.

Passing FRN links in requests to services

Links in URL paths and as query parameters

If service (e.g. [PSetService](#)) expect links to be passed in URLs as a segment in the URL path or as a query parameter, the link must be URL encoded before including into the URL.

Links in request and response bodies

If link is passed in the body of the request (JSON content type) link should be passed as is except escaping single and double quotation marks as \' and \' in the encoded string. And other way around when getting link from the service in the response body, it should be decoded to get the quotation marks correct.

Known Resource Types

Resource type identifier	Description
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entity	Refers to entities in a model (BIM) files use (the "entity" terminology is aligned with TrimBIM format terminology). It could be model part, assembly, project object, space, etc.
tcfile	refer to file in a Trimble Connect
user	A TID user identifier
forest	OrgService forest
tree	OrgService tree
node	OrgService node
lib	PSetService library
def	PSetService definition
pset	PSetService pset instance

Examples

Refer to specific version of a file in Trimble Connect

```
frn:tcfile:Dyfw481fE9U:LWOf7rirztM
```

Refer to file in Trimble Connect without specifying version

```
frn:tcfile:Dyfw481fE9U
```

The model object in specific version of TrimBIM(IFC) model stored in Trimble Connect

```
frn:tcfile:q-XKNAhg3Rk:woC32em2Fb0/entity:11kcFGefEFzfFoAMfBVZT9
```

Or not specific file version:

```
frn:tcfile:q-XKNAhg3Rk/entity:11kcFGefEFzfFoAMfBVZT9
```

The model object from TrimBIM(DWG) model stored in Trimble Connect

```
frn:tcfile:q-XKNAhg3Rk:woC32em2Fb0/entity:12
```

The model object without specifying specific file/container:

```
frn:entity:11kcFGefEFzfFoAMfBVZT9
```

Refer to task in MS Project file in Trimble Connect without specifying version of a published file

```
frn:tcfile:q-XKNAhg3Rk/task:45
```

(note the 45 above is a Unique ID of the task assigned by MS Project)

Refer to web resource

`https://tools.ietf.org/html/rfc4918`

Refer to bounding box

`frn:box:<x0>:<y0>:<z0>:<x1>:<y1>:<z1>`

Refer to point

`frn:point:<x>:<y>:<z>`

point to user

`frn:user:<uuid>`

point to resource in OrgService hierarchy

`frn:forest:<forestId>/tree:<treeID>` - to a tree

`frn:forest:<forestId>/tree:<treeID>/node:<nodeId>` - to a node

`frn:forest:<forestId>/tree:<treeID>/node:<nodeId>/links` - points to the links relation from the node