Model manipulation

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TWCloud operates at the EMF level, while MagicDraw operates at the UML level, which is on top of EMF. REST API, which is the TWCloud API, also operates at the EMF level.

Therefore, TWCloud is not affected by UML-specific implementation, and all derived properties may not be saved in the TWCloud database. The best-known derived property is *owner*. This is the result when there is no such "*setOwner"* in REST API.

Even though all non-derived properties are saved in the TWCloud database, they are saved as raw EMF data. The user is required to have knowledge about UML models to manipulate data. For example, an applied stereotype is saved as a hierarchy of *InstanceSpecification*, *Slot*, and *ValueSpecification*.

This section describes how to traverse into a UML model and create some elements in it.

MagicDraw project

In TWCloud terminology, a MagicDraw project is referred to as a *resource*. Although REST API can be used to create a TWCloud resource, it is only a bare project MagicDraw cannot read. A MagicDraw project is composed of many MagicDraw-specific meta-data such as project options, primary project, and used projects configuration. The best way to create a MagicDraw project is to create it by MagicDraw and submit it to the TWCloud server.

MagicDraw primary project

To traverse through a UML model, the primary project must be identified. The model data starts at the revision level. Issuing GET to */revisions/{revisionId}* shows the first-level object in the revision. UUIDs of the first-level object are listed in **rootObjectIDs**.

```
{
        "commitType": "NORMAL",
    "branchID": "../..",
    "resourceID": "../../..",
    "@base": "http://127.0.0.1:8111/osmc/resources/4615e8fa-81e5-40e0-a51b-8496a48caf18/revisions/5/elements",
    "author": "Administrator",
    "@type":
        [
            "RDFSource",
            "kerml:Revision"
    ],
    "pickedRevision": -1,
    "description": "Branch \"xx\" created",
    "@context": "http://127.0.0.1:8111/osmc/schemas/revision",
    "directParent": 3,
    "dependencies": [],
    "rootObjectIDs":
        [
              "429f969a-5c81-45f4-94af-8cf983f22950",
                "ec6060a3-f3d9-482b-93a3-32af9e19202c",
                "ca9a0235-f0f7-46b7-a142-e79a67c2d00d",
                "f7c3ae92-af44-4dab-8163-a199ca05c006",
                "ba3d0700-1062-4baf-a1df-a55a4f31ce54",
                "0f14cd2d-2fd0-4523-950c-627d59e1a43d",
              "7cd22dea-aaf8-4e08-bd67-5bd975c3f06a",
             "af1042fa-8b1b-4cf2-bb7d-98dd1b881da3",
                "6d24e5e7-cdff-4e9e-85b8-28b3088f85b6",
                "243020e5-da6c-4896-b32a-fcba0e93ac8d",
                "f7449238-5cd1-41eb-9025-040210b02d93",
              "4d2459a1-49dc-4eb7-aa82-9bbb4a76b038",
                "b242613d-957e-4aec-9333-e5938f50b2ab",
                "9b953064-e422-4391-b7d9-43a2d4f14a32",
                "fc997cfd-23c5-4d0b-9953-06667dcde0dd",
                "29d9416b-ead5-4a9d-b530-b23de836f1b8",
                "7af3f24b-2da9-4b31-94b3-a87f15747296"
        ],
        "createdDate": "1533051367",
        "ID": "",
    "artifacts": "artifacts"
},
```


Among these entries, the first element with the **esiproject:EsiProject** type specifies the primary project named **main decomposition project**. Other **esiproject:EsiProject** objects are the models (used projects) in a MagicDraw project. The main decomposition project is element **429f969a**. You need to load element **429f969a** and all their children. An element is represented in the JSON-LD format. The attributes of the elements are in **kerml:esiData**. There will be an element named **UML Model**. The below code fragment shows the attributes of this element.


```
"kerml:esiData":
{
        "name": "UML Model",
    "namespace": "com.nomagic.magicdraw.uml_model",
        "project":
        {
                "@id": "429f969a-5c81-45f4-94af-8cf983f22950"
        },
        "internalVersion": "1",
        "version": "17.0",
        "sections":
        [
                {
                        "@id": "b3e68e8e-2253-4726-8d05-d8f74fd0ba5a"
        }
        ]
},
```


Take the first **esiproject:EsiDataSection** from the feature's sections list, which is **b3e68e8e**. The excerpt of the **b3e68e8e** data is shown below.

```
{
        "kerml:name": "model",
        "@base": "http://127.0.0.1:8111/osmc/resources/4615e8fa-81e5-40e0-a51b-8496a48caf18/revisions/5
/elements",
        "kerml:nsURI": "http://www.nomagic.com/ns/magicdraw/esiproject/1.0",
        "@type": "esiproject:EsiDataSection",
    "kerml:owner":
        {
                "@id": "429f969a-5c81-45f4-94af-8cf983f22950"
    },
    "kerml:revision": "http://127.0.0.1:8111/osmc/resources/4615e8fa-81e5-40e0-a51b-8496a48caf18/revisions/5",
    "@context":
        {
                "esiproject:EsiDataSection": "http://127.0.0.1:8111/osmc/schema/esiproject/2014345
/EsiDataSection",
                "kerml": "http://127.0.0.1:8111/osmc/schema/kerml/20140325"
    },
    "kerml:ownedElement": [],
    "kerml:modifiedTime": "20180731223607ICT",
    "kerml:esiData":
        {
                "featuredBy":
                {
                        "@id": "c9256728-4617-4097-8e9e-dc63e2823bf8"
                },
                "rootElements":
                [
                        "ca9a0235-f0f7-46b7-a142-e79a67c2d00d"
                ],
                "name": "model",
              "project":
                {
                        "@id": "429f969a-5c81-45f4-94af-8cf983f22950"
              },
                "properties": []
        },
        "kerml:resource": "http://127.0.0.1:8111/osmc/resources/4615e8fa-81e5-40e0-a51b-8496a48caf18",
    "kerml:esiID": "b3e68e8e-2253-4726-8d05-d8f74fd0ba5a",
        "@id": "#b3e68e8e-2253-4726-8d05-d8f74fd0ba5a"
}
```


The first ID in the **rootElements** list of the data section will be the ID of the UML model root element in the resource. The root element should always be of the **uml:Package** type or derived from it.

Traversing to a MagicDraw model

Once a root project is retrieved, the whole hierarchy can be retrieved layer by layer. An element can be retrieved from */elements/{elementId}*. Child UUIDs of the resulting element are in **kerml:ownedElement**.

Multiple elements can be retrieved by POST to */elements*. In this case, you need to put UUID in the **uuid.txt** file to load elements.

```
4eeb2e6d-9cbc-4f59-9d74-69263e52ba54,520bc74d-b5b4-40d5-87cb-9d0b8aba5d2e,7a057ae7-6281-462d-9dcd-de9931633f5c,
a6212656-5ad1-4de6-a47f-db656c2c25fd
```

The command to load those elements is:

```
curl -v -H "Content-Type: text/plain" -X POST -s --cookie cookie.txt --insecure -d @uuid.txt --insecure
"https://server:8111/osmc/resources/${projectId}/elements"
```

In most cases, loading multiple elements at once is substantially faster than loading them one by one.

Creating elements

To use REST API to create elements, you are required to have knowledge about UML models, especially how to set the owner. A combination of parent-child type yields differences in the owner attribute. For example, if you want to create a class under a class, you need to set the **UMLClass** attribute in the child class. For a class under a package, you need to set **owningPackage** in the child class. The easiest way to know which attribute is needed is to try creating it in MagicDraw and get it in REST API.

There are two URLs to create element(s), */resources/{resourceId}/elements* and */resources/{resourceId}/elements{elementId}*. Please note that the *element Id* in the latter form is not the parent. An Ecore is needed to create an element. It can be specified in the following ways:

- Specified from the *elementId* in */resources/{resourceId}/elements/{elementId}*. This form is used in most cases, except for creating the first element in the project. The new element data type will be in the same namespace of this specified element.

```
{
        "@type": "uml:Class",
        "kerml:nsURI": "http://www.nomagic.com/magicdraw/UML/2.5.1",
        "kerml:esiData":
        {
                "owningPackage":
                {
                        "@id": "757be712-f397-404d-a5ff-b97567eb240f"
        },
        "name": "c3"
    }
}
```

- Specified from **kerml:nsURI**.
- Specifying the whole Ecore in **kerml:ecore**. This mode is rarely used.

```
{
        "@type": "ikml:Container",
        "kerml:esiData":
        {
                "name": "txdhdhdhd",
                "uri": "http://www.chula.ac.th",
    },
        "kerml:ecore": "<?xml version=\"1.0\" encoding=\"UTF-8\"?>\r\n<ecore:EPackage xmi:version=\"2.0
\" xmlns:xmi=\"http://www.omg.org/XMI\"
        xmlns:xsi=\"http://www.w3.org/2001/XMLSchema-instance\"\r\n
        xmlns:ecore=\"http://www.eclipse.org/emf/2002/Ecore\"
        name=\"ikml\" nsURI=\"http://www.nomagic.com/ikml/1.0\"
        nsPrefix=\"ikml\">\r\n
        <eClassifiers xsi:type=\"ecore:EClass\" name=\"Element\" abstract=\"true\"><\/eClassifiers>\r\n<\
/ecore:EPackage>\r\n"
}
```

The following script creates an element:

```
cat file.txt | curl -v -H "Content-Type: application/ld+json" -X POST -s --cookie cookie.txt --insecure -d @-
https://server:8111/osmc/resources/${projectId}/elements
```

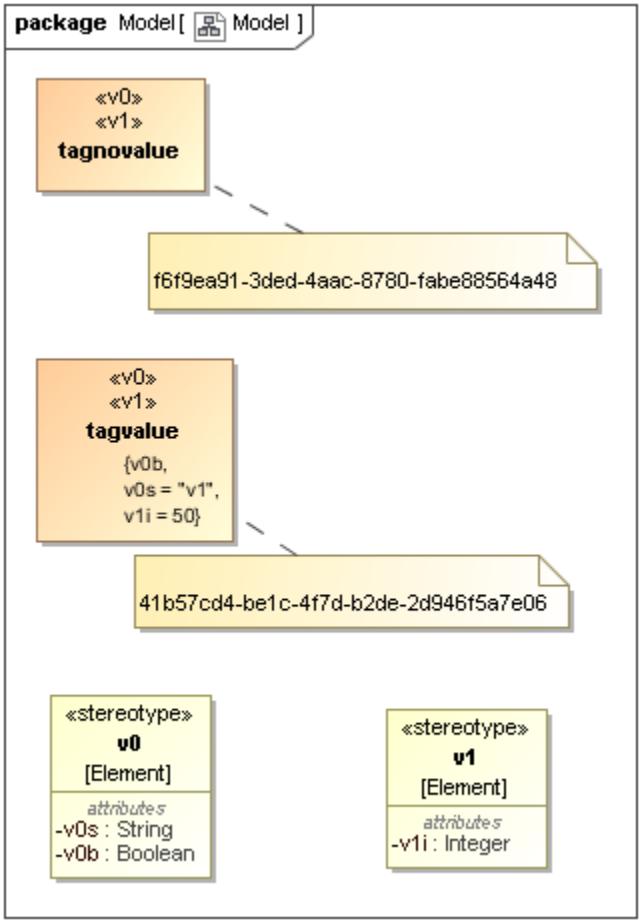
Multiple elements can be created at once by specifying the query parameter *batch=true* in the URL. The script is shown below:

```
cat file.txt | curl -v -H "Content-Type: application/ld+json" -X POST -s --cookie cookie.txt --insecure -d @-
"https://server:8111/osmc/resources/${projectId}/elements/${elementId}?batch=true"
```

Reading stereotypes

While most non-derived properties are saved in the TWCloud database, stereotypes and DSL cannot be read from the database directly. Applied stereotypes are stored as an InstanceSpecification. Each tag value is stored in each slot, which consists of a defining feature and a ValueSpecification. DSL is not provided in REST API because it is the MagicDraw mechanism. However, DSL is implemented on top of stereotypes. Values can be read from the TWCloud database as tag values.

The figure below shows typical stereotype usage in MagicDraw.



Stereotype usage in MagicDraw.

The **v0** stereotype is an element. It can be read by issuing GET to */osmc/…/elements/*

03cd6cc8-78f4-425f-ab76-5a991f913f27 as usual. Its type is **uml:Stereotype**. The code fragment below is an excerpt of the **v1** stereotype.

```
"kerml:esiID": "03cd6cc8-78f4-425f-ab76-5a991f913f27",
"@id": "#03cd6cc8-78f4-425f-ab76-5a991f913f27"
"kerml:name": "v1",
"@type": "uml:Stereotype",
"kerml:esiData":
{
        "feature":
        [
                {
                        "@id": "1c87c736-941a-47de-9ca8-49abd0aa080b"
                },
                {
                        "@id": "52463309-9dd1-4d72-abd2-c607b2ecbfc5"
                }
        ],
}
```

V1 has two features, **1c87c736** and **52463309**. Among these properties, **v1i** has a UUID of **1c87c736**, while **52463309** as base_Element is defined automatically by MagicDraw.

The information about applied stereotypes is stored in the **appliedStereotypeInstance** attribute as an InstanceSpecification. There is only one InstanceSpecification object regardless of the number of the applied stereotypes. Stereotypes are listed in the **classifier** attribute. The below code is an excerpt content of the InstanceSpecification of the **tagvalue** class.

```
"kerml:esiID": "f1b48077-7ef6-44e5-8f8d-de977dff8290",
"kerml:owner":
{
        "@id": "41b57cd4-be1c-4f7d-b2de-2d946f5a7e06"
},
"kerml:esiData":
{
        "_classifierOfInheritedMember": [],
        "_directedRelationshipOfSource": [],
        "_considerIgnoreFragmentOfMessage": [],
        "_elementOfSyncElement": [],
        "_deploymentOfDeployedArtifact": [],
        "classifier":
        [
                {
                        "@id": "4b86029b-e194-425c-bc40-beb3b8509a2b"
                },
                {
                        "@id": "03cd6cc8-78f4-425f-ab76-5a991f913f27"
                }
        ],
        "_namespaceOfMember": [],
        "_relationshipOfRelatedElement": [],
        "stereotypedElement":
        {
                "@id": "41b57cd4-be1c-4f7d-b2de-2d946f5a7e06"
        },
        "slot":
        [
                {
                        "@id": "9710abbf-924a-4c03-a109-9ee3388f57a4"
                },
                {
                        "@id": "8e5c644b-e54d-4bf1-a61c-7abf24a30666"
                },
                {
                        "@id": "8fcafea3-d6dd-491f-8232-960cc0d0fe09"
                }
        ],
}
```


The **tagvalue** class is applied with two stereotypes, namely **v0** and **v1**, which have UUID of **4b86029b** and **03cd6cc8** respectively. There are three slots representing the three tag values. First, you take one slot to read each tag value, for example, **8fcafea3**.


```
"kerml:esiData":
{
        "owningInstance":
        {
                "@id": "f1b48077-7ef6-44e5-8f8d-de977dff8290"
        },
        "definingFeature":
        {
                "@id": "1c87c736-941a-47de-9ca8-49abd0aa080b"
        },
        "value":
        [
                {
                "@id": "87b1cadd-35b6-488c-af87-71995943aae6"
                }
        ]
}
```


This slot has **definingFeature** of **1c87c736**, which referred to **v1i**. The owner, **f1b48077**, is an **InstanceSpecification**. The value of **87b1cadd** is a **ValueSpecification**. Because **v1i** is Integer, this object is **uml:LiteralInteger**.

```
"kerml:esiData":
{
        "value": "50",
        "owningSlot":
        {
                "@id": "8fcafea3-d6dd-491f-8232-960cc0d0fe09"
        },
}
```

Related pages

- REST APIs
- General convention
- Authentication
- MagicDraw-specific extensions
- Developer Guide