

## **1. Validation of the generic SPARQL statements**

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# 1. Modelling Elements Integration from different Modelling Languages

## Syntactic Validation of SPARQL Rule 1 - Modelling Elements Integration

The below figure shows the syntactic validation of SPARQL Rule 1 in the SPARQLer Update Validator. Since the output (i.e., lower part of the figure) does not show any error, it can be asserted that the proposed SPARQL rule is syntactically correct.

### SPARQL Update Validator

Input:

```
1 PREFIX rdfs:<http://www.w3.org/2000/01/rdf-schema#>
2 PREFIX po:<http://fhnw.ch/modelingEnvironment/PaletteOntology#>
3 PREFIX lo:<http://fhnw.ch/modelingEnvironment/LanguageOntology#>
4 INSERT DATA {
5   po:InstanceSon po:paletteConstructHasParentPaletteConstruct po:InstanceParent .
6   lo:sourceClass rdfs:subClassOf lo:targetClass .
7 }
```

Formatted, parsed update request:

```
1 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
2 PREFIX lo:  <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
3 PREFIX po:  <http://fhnw.ch/modelingEnvironment/PaletteOntology#>
4
5 INSERT DATA {
6   po:InstanceSon po:paletteConstructHasParentPaletteConstruct po:InstanceParent .
7   lo:sourceClass rdfs:subClassOf lo:targetClass .
8 }
```

## Syntactic Validation of SPARQL Rules 2 to 5 - Modeling Language Extension

### 1.2.1 Validation SPARQL Rule 2

#### SPARQL Update Validator

Input:

```
1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
4 PREFIX po: <http://fhnw.ch/modelingEnvironment/PaletteOntology#>
5 PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
6 INSERT DATA {
7
8 lo:NewClass rdf:type rdfs:Class .
9 lo:NewClass rdfs:subClassOf lo:ExtendedClass .
10 lo:NewClass rdfs:label "name of the new class".
11 lo:NewClass rdfs:comment "comment for the new class".
12 po:InstanceOfNewClass rdf:type po:PaletteElement .
13 po:InstanceOfNewClass rdfs:label "same name entered for the new class".
14 po:InstanceOfNewClass po:paletteConstructIsRelatedToModelingLanguageConstruct lo:NewClass .
15 po:InstanceOfNewClass po:paletteConstructHasParentPaletteConstruct po:InstanceOfExtendedClass .
16 po:InstanceOfNewClass po:paletteConstructHasPaletteThumbnail "name of image"^^xsd:string .
17 po:InstanceOfNewClass po:paletteConstructHasModelImage "name of image"^^xsd:string .
18 po:InstanceOfNewClass po:paletteConstructHasWidth "number of pixel"^^xsd:integer .
19 po:InstanceOfNewClass po:paletteConstructHasHeight "number of pixel"^^xsd:integer .
20 po:InstanceOfNewClass po:paletteConstructIsGroupedInPaletteCategory lo:PaletteCategory .
21 po:InstanceOfNewClass po:paletteConstructIsHiddenFromPalette "false"^^xsd:boolean .
22
23 }
```

Formatted, parsed update request:

```
1 PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 PREFIX po: <http://fhnw.ch/modelingEnvironment/PaletteOntology#>
6
7 INSERT DATA {
8 lo:NewClass rdf:type rdfs:Class .
9 lo:NewClass rdfs:subClassOf lo:ExtendedClass .
10 lo:NewClass rdfs:label "name of the new class" .
11 lo:NewClass rdfs:comment "comment for the new class" .
12 po:InstanceOfNewClass rdf:type po:PaletteElement .
13 po:InstanceOfNewClass rdfs:label "same name entered for the new class" .
14 po:InstanceOfNewClass po:paletteConstructIsRelatedToModelingLanguageConstruct lo:NewClass .
15 po:InstanceOfNewClass po:paletteConstructHasParentPaletteConstruct po:InstanceOfExtendedClass .
16 po:InstanceOfNewClass po:paletteConstructHasPaletteThumbnail "name of image" .
17 po:InstanceOfNewClass po:paletteConstructHasModelImage "name of image" .
18 po:InstanceOfNewClass po:paletteConstructHasWidth "number of pixel"^^xsd:integer .
19 po:InstanceOfNewClass po:paletteConstructHasHeight "number of pixel"^^xsd:integer .
20 po:InstanceOfNewClass po:paletteConstructIsGroupedInPaletteCategory lo:PaletteCategory .
21 po:InstanceOfNewClass po:paletteConstructIsHiddenFromPalette false .
22 }
```

## 1.2.2 Validation SPARQL Rule 3

### SPARQL Update Validator

Input:

```
1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
4 PREFIX do: <http://fhnw.ch/modelingEnvironment/DomainOntology#>
5 INSERT DATA {
6
7 lo:isMappedWithClassD01 rdf:type rdf:Property .
8 lo:isMappedWithClassD01 rdfs:domain lo:NewClass .
9 lo:isMappedWithClassD01 rdfs:range do:ClassD01 .
10 }
```

Formatted, parsed update request:

```
1 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
2 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
3 PREFIX do: <http://fhnw.ch/modelingEnvironment/DomainOntology#>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5
6 INSERT DATA {
7 lo:isMappedWithClassD01 rdf:type rdf:Property .
8 lo:isMappedWithClassD01 rdfs:domain lo:NewClass .
9 lo:isMappedWithClassD01 rdfs:range do:ClassD01 .
10 }
```

## 1.2.3 Validation SPARQL Rule 4

### SPARQL Update Validator

Input:

```
1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
3 PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
4 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
5 INSERT DATA {
6 lo:hasAttrF rdf:type rdf:Property .
7 lo:hasAttrE rdf:type rdf:Property .
8 lo:hasAttrF rdfs:domain lo:NewClass .
9 lo:hasAttrE rdfs:domain lo:NewClass .
10 lo:hasAttrF rdfs:range xsd:string .
11 lo:hasAttrE rdfs:range "true"^^xsd:boolean .
12 }
```

Formatted, parsed update request:

```
1 PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5
6 INSERT DATA {
7 lo:hasAttrF rdf:type rdf:Property .
8 lo:hasAttrE rdf:type rdf:Property .
9 lo:hasAttrF rdfs:domain lo:NewClass .
10 lo:hasAttrE rdfs:domain lo:NewClass .
11 lo:hasAttrF rdfs:range xsd:string .
12 lo:hasAttrE rdfs:range true .
13 }
```

### 1.2.4 Validation SPARQL Rule 5

The below figure shows the syntactical validation report for SPARQL Rule 5.

#### SPARQL Update Validator

Input:

```
1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX do: <http://fhnw.ch/modelingEnvironment/DomainOntology#>
3 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
4 INSERT DATA {
5
6 do:NewDOconcept rdf:type rdfs:Class .
7 do:NewDOconcept rdf:label "New class in DO" .
8 do:NewDOconcept rdfs:subClassOf do:ClassInDO .
9 }
```

Formatted, parsed update request:

```
1 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
2 PREFIX do: <http://fhnw.ch/modelingEnvironment/DomainOntology#>
3 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
4
5 INSERT DATA {
6   do:NewDOconcept rdf:type rdfs:Class .
7   do:NewDOconcept rdf:label "New class in DO" .
8   do:NewDOconcept rdfs:subClassOf do:ClassInDO .
9 }
```

## Syntactic Validation of SPARQL Rules 6 and 7 to Delete a Resource

The below figure shows the screenshot for the syntactic validation of SPARQL Rule 6 to delete a modelling construct. The outcome in the figure validates also SPARQL Rule 7 for deleting a property as it has the same structure as SPARQL Rule 6.

SPARQL Update Validator

Input:

```
1 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
2
3 DELETE WHERE {
4
5   lo:ModelingCosntructToDelete ?predicate ?object. }
```

Formatted, parsed update request:

```
1 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
2
3 DELETE WHERE
4 {
5   lo:ModelingCosntructToDelete ?predicate ?object .
6 }
```

## Syntactic Validation of the SPARQL Rules 8 to 11- Update a Resource

All the introduced SPARQL rules were syntactically validated. The figure below shows the screenshot of the validation for the “DELETE DATA” part of SPARQL Rule 8. The validation reports for SPARQL Rule 9 to 11 can be found in the following sub-sections.

Delete statement:

SPARQL Update Validator

Input:

```
1 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
2 PREFIX po: <http://fhnw.ch/modelingEnvironment/PaletteOntology#>
3 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
4 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
5 DELETE DATA{
6   lo:ModelingConstructToUpdate rdfs:label "name of class to delete" .
7   lo:ModelingConstructToUpdate rdfs:comment "description to delete" .
8   po:PaletteElementInstanceToUpdate rdfs:label "name of instance to delete" .
9   po:PaletteElementInstanceToUpdate po:hasPaletteThumbnail "name graphical notation to delete" .
10  po:PaletteElementInstanceToUpdate po:hasModelImage "name graphical notation to delete" .
11  po:PaletteElementInstanceToUpdate po:hiddenFromPalette "value of the property to delete" .
12 }
```

Formatted, parsed update request:

```
1 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
2 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
3 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
4 PREFIX po: <http://fhnw.ch/modelingEnvironment/PaletteOntology#>
5
6 DELETE DATA {
7   lo:ModelingConstructToUpdate rdfs:label "name of class to delete" .
8   lo:ModelingConstructToUpdate rdfs:comment "description to delete" .
9   po:PaletteElementInstanceToUpdate rdfs:label "name of instance to delete" .
10  po:PaletteElementInstanceToUpdate po:hasPaletteThumbnail "name graphical notation to delete" .
11  po:PaletteElementInstanceToUpdate po:hasModelImage "name graphical notation to delete" .
12  po:PaletteElementInstanceToUpdate po:hiddenFromPalette "value of the property to delete" .
13 }
```

## Insert Statement

### SPARQL Update Validator

Input:

```
1 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
2 PREFIX po: <http://fhnw.ch/modelingEnvironment/PaletteOntology#>
3 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
4 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
5 INSERT DATA{
6 lo:ModelingConstructToUpdate rdfs:label "new name of class" .
7 lo:ModelingConstructToUpdate rdfs:comment "new description" .
8 po:PaletteElementInstanceToUpdate rdfs:label "name of instance to delete" .
9 po:PaletteElementInstanceToUpdate po:hasPaletteThumbnail "new name of the selected graphical notation" .
10 po:PaletteElementInstanceToUpdate po:hasModelImage "new name of the selected graphical notation" .
11 po:PaletteElementInstanceToUpdate po:hiddenFromPalette "new value of the property" .
12 }
```

Formatted, parsed update request:

```
1 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
2 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
3 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
4 PREFIX po: <http://fhnw.ch/modelingEnvironment/PaletteOntology#>
5
6 INSERT DATA {
7   lo:ModelingConstructToUpdate rdfs:label "new name of class" .
8   lo:ModelingConstructToUpdate rdfs:comment "new description" .
9   po:PaletteElementInstanceToUpdate rdfs:label "name of instance to delete" .
10  po:PaletteElementInstanceToUpdate po:hasPaletteThumbnail "new name of the selected graphical notation" .
11  po:PaletteElementInstanceToUpdate po:hasModelImage "new name of the selected graphical notation" .
12  po:PaletteElementInstanceToUpdate po:hiddenFromPalette "new value of the property" .
13 }
```

## 1.4.1 Validation of the SPARQL Rule 9

### Delete Statement

### SPARQL Update Validator

Input:

```
1 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX do: <http://fhnw.ch/modelingEnvironment/DomainOntology#>
4 DELETE DATA{
5 lo:ObjectPropertyToUpdate rdfs:label "name to replace" .
6 lo:ObjectPropertyToUpdate rdfs:range lo:ConceptToReplace .
7 }
```

Formatted, parsed update request:

```
1 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
2 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
3 PREFIX do: <http://fhnw.ch/modelingEnvironment/DomainOntology#>
4
5 DELETE DATA {
6   lo:ObjectPropertyToUpdate rdfs:label "name to replace" .
7   lo:ObjectPropertyToUpdate rdfs:range lo:ConceptToReplace .
8 }
```

Insert Statement

## SPARQL Update Validator

Input:

```
1 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX do: <http://fhnw.ch/modelingEnvironment/DomainOntology#>
4 INSERT DATA{
5   lo:ObjectPropertyToUpdate rdfs:label "new name to replace" .
6   lo:ObjectPropertyToUpdate rdfs:range lo:NewConcept .
7 }
```

Formatted, parsed update request:

```
1 PREFIX   rdfs: <http://www.w3.org/2000/01/rdf-schema#>
2 PREFIX   lo:   <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
3 PREFIX   do:   <http://fhnw.ch/modelingEnvironment/DomainOntology#>
4
5 INSERT DATA {
6   lo:ObjectPropertyToUpdate rdfs:label "new name to replace" .
7   lo:ObjectPropertyToUpdate rdfs:range lo:NewConcept .
8 }
```

### 1.4.2 Validation of the SPARQL Rule 10

Delete statement

## SPARQL Update Validator

Input:

```
1 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
4 DELETE DATA{
5   lo:DataTypePropertyToUpdate rdfs:label "name to replace" .
6   lo:DataTypePropertyToUpdate rdfs:range "value to replace" .
7 }
```

Formatted, parsed update request:

```
1 PREFIX   xsd: <http://www.w3.org/2001/XMLSchema#>
2 PREFIX   rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX   lo:   <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
4
5 DELETE DATA {
6   lo:DataTypePropertyToUpdate rdfs:label "name to replace" .
7   lo:DataTypePropertyToUpdate rdfs:range "value to replace" .
8 }
```



Insert statement

## SPARQL Update Validator

Input:

```
1 PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
4 INSERT DATA{
5   lo:DataTypePropertyToUpdate rdfs:label "New name to replace" .
6   lo:DataTypePropertyToUpdate rdfs:range "New type and/or value to replace" .
7 }
```

Formatted, parsed update request:

```
1 PREFIX   xsd:   <http://www.w3.org/2001/XMLSchema#>
2 PREFIX   rdfs:  <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX   lo:    <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
4
5 INSERT DATA {
6   lo:DataTypePropertyToUpdate rdfs:label "New name to replace" .
7   lo:DataTypePropertyToUpdate rdfs:range "New type and/or value to replace" .
8 }
```