

TSN Ontological Model - SPARQL queries example

Ontologies URIs: <http://purl.org/net/tsn#> ; <http://purl.org/net/tsnchange#>

Datasets URIs: <http://purl.org/steamer/nuts/> ; <http://purl.org/steamer/asgs/> ; <http://purl.org/steamer/sau/>

SPARQL endpoint: <http://steamerlod.imag.fr/sparql?>

Usage: e.g., <http://steamerlod.imag.fr/sparql?&query=DESCRIBE<http://purl.org/steamer/nuts/V1999>>

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
PREFIX asgs: <http://purl.org/steamer/asgs/>
PREFIX sau: <http://purl.org/steamer/sau/>
```

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1. Count all resources in a graph

```
SELECT (COUNT(*) as ?Triples)
WHERE
{ GRAPH <http://purl.org/steamer/asgs>
  { ?s ?p ?o }
}
```

2. Count number of change nodes in the triple store

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
SELECT (COUNT(distinct ?change) as ?count)
WHERE {
  ?change rdf:type tsnchange:Change .
}
```

3. Count number of change nodes between two TSN versions

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX sau: <http://purl.org/steamer/nuts/>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT (count(distinct ?change) as ?count)
WHERE {
  {
    ?change rdf:type tsnchange:Change .
    ?inputTU tsnchange:input ?change .
    ?inputTU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf nuts:V2003 .
  } UNION {
    ?change rdf:type tsnchange:Change .
    ?inputLevel tsnchange:input ?change .
    ?inputLevel tsn:isDivisionOf nuts:V2003 .
  } UNION {
    ?change rdf:type tsnchange:Change .
    ?outputTU tsnchange:output ?change .
    ?outputTU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf nuts:V2006 .
  } UNION {
    ?change rdf:type tsnchange:Change .
    ?outputLevel tsnchange:output ?change .
    ?outputLevel tsn:isDivisionOf nuts:V2006 .
  }
}
```

4. Count number of change nodes of a specific type in the triple store

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
SELECT (COUNT(distinct ?change) as ?count)
WHERE {
    change rdf:type tsnchange:Change .
    ?change rdf:type tsnchange:Split .
}
```

5. Count number of structure change nodes of a specific type between two TSN versions

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT (COUNT(distinct ?change) as ?count)
WHERE {
    ?change rdf:type tsnchange:Change .
    ?change rdf:type tsnchange:Split .
    ?inputTU tsnchange:input ?change .
    ?inputTU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf nuts:V1999 .
}
```

6. Count number of feature change nodes between two TSN versions

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX sau: <http://purl.org/steamer/sau/>
SELECT (count(distinct ?change) as ?count)
WHERE {{
    ?change rdf:type tsnchange:FeatureChange .
    ?inputTU tsnchange:input ?change .
    ?inputTU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf sau:V2017 .
}UNION{
    ?change rdf:type tsnchange:FeatureChange .
    ?inputLevel tsnchange:input ?change .
    ?inputLevel tsn:isDivisionOf sau:V2017 .
}UNION{
    ?change rdf:type tsnchange:FeatureChange .
    ?outputTU tsnchange:output ?change .
    ?outputTU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf sau:V2018 .
}UNION {
    ?change rdf:type tsnchange:FeatureChange .
    ?outputLevel tsnchange:output ?change .
    ?outputLevel tsn:isDivisionOf sau:V2018 . }}}
```

7. Count number of Structure change nodes between two TSN versions

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX sau: <http://purl.org/steamer/sau/>
SELECT (count(distinct ?change) as ?count)
WHERE {
  {
    ?change rdf:type tsnchange:StructureChange .
    ?inputTU tsnchange:input ?change .
    ?inputTU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf sau:V2017 .
  } UNION {
    ?change rdf:type tsnchange:StructureChange .
    ?inputLevel tsnchange:input ?change .
    ?inputLevel tsn:isDivisionOf sau:V2017 .
  } UNION {
    ?change rdf:type tsnchange:StructureChange
    .
    ?outputTU tsnchange:output ?change .
    ?outputTU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf sau:V2018 .
  } UNION {
    ?change rdf:type tsnchange:StructureChange .
    ?outputLevel tsnchange:output ?change .
    ?outputLevel tsn:isDivisionOf sau:V2018 .
  }
}
```

8. Select all change graph entry points

All entry points in the triple store

```
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
SELECT * WHERE {
  ?inputNomenclatureVersion tsnchange:inputNomenclatureVersion ?
parent_change_node .
  ?outputNomenclatureVersion
tsnchange:outputNomenclatureVersion ?parent_change_node . }
```

Entry points between two TSN versions

```
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
SELECT * WHERE {
  ?inputNomenclatureVersion tsnchange:inputNomenclatureVersion ?
parent_change_node .
  ?outputNomenclatureVersion
tsnchange:outputNomenclatureVersion ?parent_change_node .
  ?inputNomenclatureVersion tsn:hasIdentifier "NUTS1999" .
  ?outputNomenclatureVersion tsn:hasIdentifier "NUTS2003" .
}
```

9. Get the list of all TUs' Versions

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsn: <http://purl.org/net/tsn#>
SELECT * WHERE {
    ?TU rdf:type tsn:UnitVersion .}
```

10. Get the list of all TUs' Version in one TSN version

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT DISTINCT ?TU WHERE {
    ?TU rdf:type tsn:UnitVersion .
    ?TU tsn:isMemberOf ?levelVersion .
    ?levelVersion tsn:isDivisionOf nuts:V1999 .
}
```

11. Get the list of all TUs' Version in one TSN version for one territorial level

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT DISTINCT ?TU WHERE {
    ?TU rdf:type tsn:UnitVersion .
    ?TU tsn:isMemberOf ?levelVersion .
    ?levelVersion tsn:hasIdentifier "NUTS_V1999_L3" .
}
```

12. Get the list of all TUs' Version that change between two TSN versions, at one territorial level (ORANGE)

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT DISTINCT ?TU ?change WHERE {
    ?TU rdf:type tsn:UnitVersion .
    ?TU tsnchange:input ?change .
    ?change a tsnchange:Change .
    ?TU tsn:isMemberOf ?level .
    ?level tsn:hasIdentifier "NUTS_V1999_L1" .
}ORDERBY ?TU
```

13. Get the list of all changes in the triple store

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
SELECT DISTINCT ?change
WHERE {
    ?change rdf:type tsnchange:Change .
}
```

14. Get the list of all changes between two TSN versions

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT DISTINCT ?change
WHERE {
    {
        ?change rdf:type tsnchange:Change .
        ?inputTU tsnchange:input ?change .
        ?inputTU tsn:isMemberOf ?level .
        ?level tsn:isDivisionOf nuts:V1999 .
    }
    UNION{
        ?change rdf:type tsnchange:Change .
        ?inputLevel tsnchange:input ?change .
        ?inputLevel tsn:isDivisionOf nuts:V1999 .
    }
}
```

15. Get the list of all TU's changes between two TSN versions

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT DISTINCT ?change
WHERE {
    ?change rdf:type tsnchange:Change .
    ?inputTU tsnchange:input ?change .
    ?inputTU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf nuts:V1999 .
}
```

16. Get the list of all TU's changes between two TSN versions at one level

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT DISTINCT ?change
WHERE {
    ?change rdf:type tsnchange:Change .
    ?inputTU tsnchange:input ?change .
    ?inputTU tsn:isMemberOf ?level .
    ?level tsn:hasIdentifier "NUTS_V1999_L3" .
    ?level tsn:isDivisionOf nuts:V1999 .
}
```

17. Get the list of all TU's changes of a specified type (e.g. Extraction) between two TSN versions at one level

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT DISTINCT ?change
WHERE {
    ?change rdf:type tsnchange:Change .
    ?change rdf:type tsnchange:Extraction .
    ?inputTU tsnchange:input ?change .
    ?inputTU tsn:isMemberOf ?level .
    ?level tsn:hasIdentifier "NUTS_V1999_L2" .
    ?level tsn:isDivisionOf nuts:V1999 .
}
```

18. Get the list of all TUs that do not change

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT DISTINCT ?TU WHERE {
    ?TU rdf:type tsn:UnitVersion
    FILTER (
        !EXISTS {
            ?TU tsnchange:input ?change .
        }
    )
}
```

19. Get the list of all TUs that do not change between two TSN versions (GREEN)

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
SELECT DISTINCT ?TU WHERE {
    ?TU rdf:type tsn:UnitVersion .
    ?TU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf nuts:V1999 .
    FILTER (
        !EXISTS {
            ?TU tsnchange:input ?change .
        })
}
```

Count

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT (COUNT(distinct ?TU) as ?count) WHERE {
    ?TU rdf:type tsn:UnitVersion .
    ?TU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf nuts:V1999 .
    FILTER (
        !EXISTS {
            ?TU tsnchange:input ?change .
        })
}
```

20. Get the list of all TUs that disappears between two TSN versions (RED)

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT DISTINCT ?TU
WHERE {
    ?TU rdf:type tsn:UnitVersion .
    ?TU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf nuts:V1999 .
    ?TU tsnchange:input ?change .
    ?change rdf:type tsnchange:Disappearance .
}
```


Count

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX nuts: <http://purl.org/steamer/nuts/>
SELECT (COUNT(distinct ?TU) as ?count)
WHERE {
    ?TU rdf:type tsn:UnitVersion .
    ?TU tsn:isMemberOf ?level .
    ?level tsn:isDivisionOf nuts:V1999 .
    ?TU tsnchange:input ?change .
    ?change rdf:type tsnchange:Disappearance .
}
```

21.Territorial Unit Lifeline

NB: Here, we draw the lifeline of an area, based on its statistical code (hasIdentifier).

Select

```
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
SELECT * {
    ?TU_input ?predicat ?TU_output .
    {
        SELECT * WHERE {
            ?TU_input tsnchange:inputUnitVersion ?change .
            ?change tsnchange:unitVersionAfter ?TU_output .
            ?TU_input tsn:hasIdentifier "ES63".}
    } UNION {
        SELECT * WHERE {
            ?TU_input tsnchange:hasNextVersion ?TU_output .
            ?TU_input tsn:hasIdentifier "ES63".}
    }
} ORDERBY ?TU_input
```

Construct

```
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
CONSTRUCT {
    ?TU_input tsnchange:inputUnitVersion ?change ;
    tsnchange:hasNextVersion ?TU_output .
}
FROM <http://purl.org/steamer/nuts>
WHERE{
    {
        ?TU_input tsnchange:inputUnitVersion ?change .
        ?change tsnchange:unitVersionAfter ?TU_output .
        ?TU_input tsn:hasIdentifier "ES63".
    }UNION {
        ?TU_input tsnchange:hasNextVersion ?TU_output .
        ?TU_input tsn:hasIdentifier "ES63".
    }
}}
```

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsncchange: <http://purl.org/net/tsncchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX : <http://purl.org/steamer/nuts/>
CONSTRUCT {
    ?s ?p ?o .
    ?TU_before tsncchange:intputUnitVersion ?o .
    ?TU_after tsncchange:outputUnitVersion ?o .}
FROM <http://purl.org/steamer/nuts> WHERE{
select distinct ?s ?p ?o ?TU before ?TU after where {
```

```

values ?p {tsnchange:inputUnitVersion tsnchange:lowerChange }
:V1999_L1_ES6 (tsnchange:inputUnitVersion|
tsnchange:lowerChange)* ?s .
?s ?p ?o .
?o (tsnchange:lowerChange)* :change_unitchange_V1999_L3_ES631 .
Optional{
?TU_before tsnchange:inputUnitVersion* ?o .
?TU_before a tsn:UnitVersion .
?TU_after tsnchange:outputUnitVersion* ?o .
?TU_after a tsn:UnitVersion .
}
}}

```



```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX : <http://purl.org/steamer/asgs/>
CONSTRUCT {
  ?s ?p ?o .
  ?TU_before tsnchange:inputUnitVersion ?o .
  ?TU_after tsnchange:outputUnitVersion ?o .}
FROM <http://purl.org/steamer/asgs> WHERE{
select distinct ?s ?p ?o ?TU_before ?TU_after where {
  values ?p {tsnchange:inputUnitVersion tsnchange:lowerChange }
  :V2011_L4_508 (tsnchange:inputUnitVersion|
tsnchange:lowerChange)* ?s .
  ?s ?p ?o .
  ?o
(tsnchange:lowerChange)* :change_unitchange_V2011_L2_508011194 .
Optional{
  ?TU_before tsnchange:inputUnitVersion* ?o .
  ?TU_before a tsn:UnitVersion .
  ?TU_after tsnchange:outputUnitVersion* ?o .
  ?TU_after a tsn:UnitVersion .
}
}}

```

24. Get the multi-level change graph of a Sub-TU (Postorder traversal) (from leafs to top)

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX tsnchange: <http://purl.org/net/tsnchange#>
PREFIX tsn: <http://purl.org/net/tsn#>
PREFIX : <http://purl.org/steamer/asgs/>
CONSTRUCT {
  ?s ?p ?o .
  ?TU_before tsnchange:inputUnitVersion ?o .
  ?TU_after tsnchange:outputUnitVersion ?o .}
FROM <http://purl.org/steamer/asgs> WHERE{
select distinct ?s ?p ?o ?TU_before ?TU_after where {
  values ?p {tsnchange:inputUnitVersion tsnchange:upperChange }
  :V2011_L2_508011194 (tsnchange:inputUnitVersion|
tsnchange:upperChange)* ?s .
  ?s ?p ?o .
  ?o (tsnchange:upperChange)* :change_unitchange_V2011_L4_508.
Optional{
  ?TU_before tsnchange:inputUnitVersion* ?o .
  ?TU_before a tsn:UnitVersion .
  ?TU_after tsnchange:outputUnitVersion* ?o .
  ?TU_after a tsn:UnitVersion . } } }

```