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/>
```

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 {
   ?intputNomenclatureVersion 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 {
   ?intputNomenclatureVersion tsnchange:inputNomenclatureVersion ?
parent_change_node .
   ?outputNomenclatureVersion
tsnchange:outputNomenclatureVersion ?parent_change_node .
   ?intputNomenclatureVersion 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 WHERE {
   ?TU rdf:type tsn:UnitVersion .
   ?TU tsnchange:input ?change .
   ?change a tsnchange:Change .
   ?TU tsn:isMemberOf ?level .
   ?level  tsn:hasIdentifier  "NUTS_V1999_L1" .
  MINUS
    {?change a tsnchange:Disappearance . }
   }
```

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 .
}
```
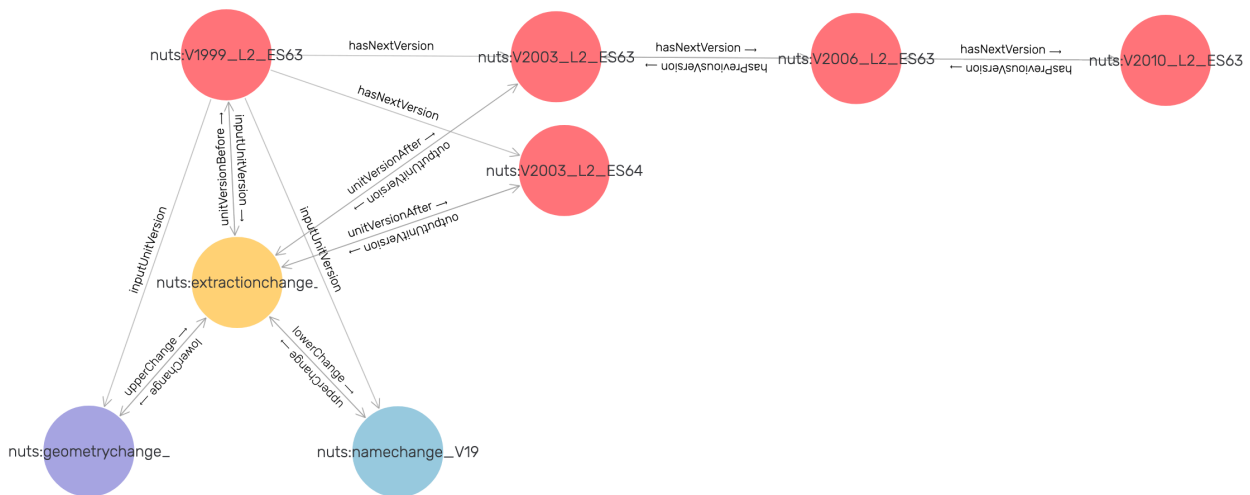
21.Territorial Unit Lifeline

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".
    }}
```

22.Territorial Unit Lifeline and Sub-Units Lifelines

```
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 .
                FILTER regex(str(?TU_input), "ES63").}
    } UNION {
        SELECT * WHERE {
        ?TU_input tsnchange:hasNextVersion ?TU_output .
                FILTER regex(str(?TU_input), "ES63").}
    }
} ORDERBY ?TU_input
```

---

23. Get the multi-level change graph of a Super-TU (Preorder traversal) (from top to leafs)

```
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/nuts/>
CONSTRUCT {
 ?s ?p ?o .
 ?TU_before tsnchange:intputUnitVersion ?o .
 ?TU_after tsnchange: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:intputUnitVersion ?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:intputUnitVersion ?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 .         } }}
```