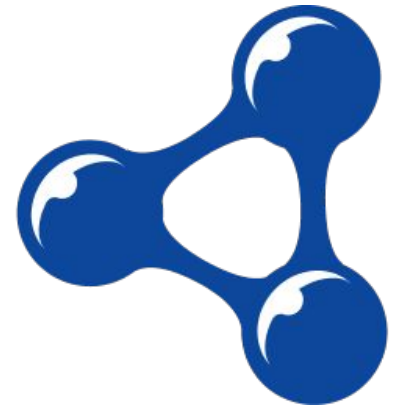




SPARQL

SPARQL Protocol and
RDF Query Language

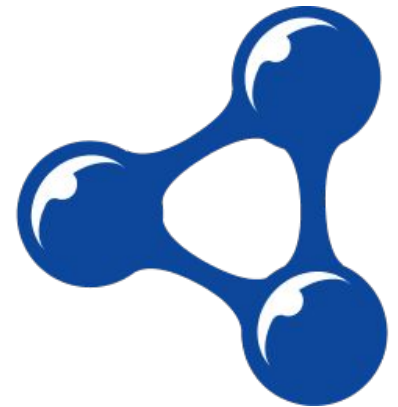


SPARQL

- SPARQL Query Language (1.1)
 - SELECT
 - CONSTRUCT
 - ASK
 - DESCRIBE
- SPARQL UPDATE (1.1)
 - INSERT
 - DELETE



SELECT



SELECT

WILDCARD - MATCH ALL

```
# QUERY 1: WILDCARD QUERY RETURNING ALL VALUES FOR ALL  
VARIABLES MATCHING ALL TRIPLES
```

```
SELECT *  
WHERE {  
    ?subject ?predicate ?object .  
}
```

SELECT MATCH PUMP

```
# QUERY 2A: RETURNING ALL SUBJECTS THAT SOMEHOW IS RELATED TO A  
PUMP  
SELECT ?subject  
WHERE {  
    ?subject ?predicate <http://www.webstep.no/workshop/ens/Pump> .  
}
```

SELECT MATCH PUMP

QUERY 2A: RETURNING ALL SUBJECTS THAT SOMEHOW IS RELATED TO A PUMP

```
SELECT ?subject
WHERE {
    ?subject ?predicate <http://www.webstep.no/workshop/ens/Pump> .
}
```

QUERY 2B: SAME AS ABOVE, BUT WITH PREFIX

PREFIX **ens:** <<http://www.webstep.no/workshop/ens/>>

```
SELECT ?subject
WHERE {
    ?subject ?predicate ens:Pump .
}
```

SELECT

AGGREGATE - COUNT PREDICATE

```
# QUERY 3: COUNTING THE NUMBER OF TIMES A PREDICATE IS USED
SELECT ?predicate (count(?predicate) AS ?numberOf)
WHERE {
    ?subject ?predicate ?object .
}
GROUP BY ?predicate
# ORDER BY DESC(?numberOf)
```

SELECT

AGGREGATE - COUNT PUMP

QUERY 4: CAN WE COUNT INSTANCES OF PUMP?

```
SELECT ?pump (count(?pump) AS ?numberOf)
```

```
WHERE {
```

```
    ?subject ?predicate ?pump .
```

```
}
```

```
GROUP BY ?pump
```


SELECT

AGGREGATE - COUNT PUMP

```
# QUERY 5A: COUNT INDIVIDUALS THAT IS AT LEAST OF TYPE PUMP
PREFIX ens: <http://www.webstep.no/workshop/ens/>
SELECT ?pump (count(?pump) AS ?numberOf)
WHERE {
    ?subject a ens:Pump .
    ?subject a ?pump .
}
GROUP BY ?pump
```

SELECT

AGGREGATE - COUNT PUMP

QUERY 5A: COUNT INDIVIDUAL THAT IS AT LEAST OF TYPE PUMP

PREFIX **ens:** <<http://www.webstep.no/workshop/ens/>>

SELECT ?pump (count(?pump) AS ?numberOf)

WHERE {

 ?subject a **ens:Pump** .

 ?subject a ?pump .

}

GROUP BY ?pump

QUERY 5B: GRAPH PATTERNS IN SPARQL CAN BE WRITTEN AS TURTLE

PREFIX **ens:** <<http://www.webstep.no/workshop/ens/>>

SELECT ?pump (count(?pump) AS ?numberOf)

WHERE {

 ?subject a **ens:Pump** , ?pump .

}

GROUP BY ?pump

SELECT

AGGREGATE - SUMMATION

```
# QUERY 6: SUMMATION OF PROPERTIES FOR THE SUBMERGED PUMPS
PREFIX ens: <http://www.webstep.no/workshop/ens/>
SELECT ?flowProperty (sum(?normalFlow) AS ?totalFlow)
WHERE {
    ?subject a ens:Pump_PH ;
             ?flowProperty ?normalFlow .
}
GROUP BY ?flowProperty
```

SELECT FILTER

```
# QUERY 7: FILTERING SO THAT ONLY NORMAL FLOW IS SUMMED
PREFIX ens: <http://www.webstep.no/workshop/ens/>
SELECT ?flowProperty (sum(?normalFlow) AS ?totalFlow)
WHERE {
    ?subject a ens:Pump_PH ;
             ?flowProperty ?normalFlow .

    FILTER(?flowProperty = ens:normalFlow_m3h)
}
GROUP BY ?flowProperty
```

SELECT OPTIONAL

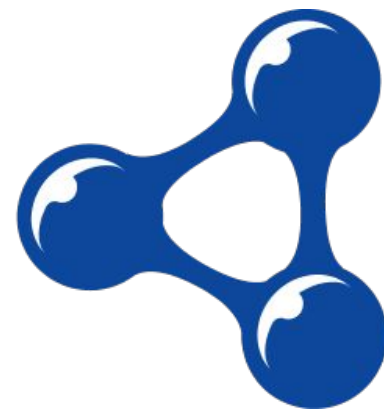
```
# QUERY 8: ONLY GET PUMPS WHERE THE NORMAL FLOW HAS A VALUE
PREFIX ens: <http://www.webstep.no/workshop/ens/>
SELECT ?pump ?normalFlow
WHERE {
    ?pump a ens:Pump ;
          ens:normalFlow_m3h ?normalFlow .
}
```

SELECT OPTIONAL

```
# QUERY 9: GET PUMPS WITH OR WITHOUT NORMAL FLOW VALUES
PREFIX ens: <http://www.webstep.no/workshop/ens/>
SELECT ?pump ?normalFlow
WHERE {
    ?pump a ens:Pump .
    OPTIONAL { ?pump ens:normalFlow_m3h ?normalFlow . }
}
```



CONSTRUCT



CONSTRUCT

COPY GRAPH

```
# QUERY 10: COPY THE ENTIRE GRAPH
```

```
CONSTRUCT { ?s ?p ?o . }
```

```
WHERE {
```

```
    ?s ?p ?o .
```

```
}
```


CONSTRUCT

RETURN TRIPLES FOR A NAMED INDIVIDUAL

```
# QUERY 11: RETURN TRIPLES FOR AN INDIVIDUAL
PREFIX data:      <http://www.webstep.no/workshop/data/>
CONSTRUCT { data:50_PH50B ?p ?o . }
WHERE {
    data:50_PH50B ?p ?o .
}
```

CONSTRUCT

RETURN NESTED TRIPLES FOR A NAMED INDIVIDUAL

```
# QUERY 12: RETURN NESTED TRIPLES FOR AN INDIVIDUAL
PREFIX data:      <http://www.webstep.no/workshop/data/>
CONSTRUCT
{
  ?individual ?firstLevelProperty ?firstLevelObject .
  ?firstLevelObject ?secondLevelProperty ?secondLevelObject
}
WHERE
{
  ?individual ?firstLevelProperty ?firstLevelObject .

  OPTIONAL { ?firstLevelObject ?secondLevelProperty ?secondLevelObject . }

  FILTER(?individual = data:50_PH50B)
}
```

CONSTRUCT

VARIABLE ASSIGNMENT

```
# QUERY 13: CREATE AN IRI AND BIND IT TO A NEW VARIABLE
PREFIX data: <http://www.webstep.no/workshop/data/>
PREFIX ens: <http://www.webstep.no/workshop/ens/>
CONSTRUCT
{
    ?systemIRI a ens:System
}
WHERE
{
    ?pump a ens:Pump ;
        ens:partOfSystem ?system .

    BIND(IRI(CONCAT(STR(data:), ?system)) AS ?systemIRI )
}
```

CONSTRUCT

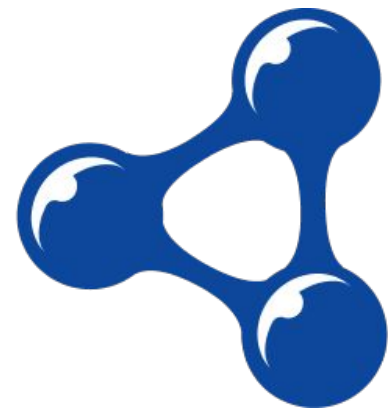
CREATE NEW DATA

```
# QUERY 14: EXTEND QUERY 13 TO PRODUCE MORE TRIPLES
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX data: <http://www.webstep.no/workshop/data/>
PREFIX ens: <http://www.webstep.no/workshop/ens/>
CONSTRUCT
{
    ?systemIRI a ens:System ;
               rdfs:label ?system .
    ?pump ens:partOfSystem ?systemIRI .
}
WHERE
{
    ?pump a ens:Pump ;
          ens:partOfSystem ?system .

    BIND( IRI( CONCAT( STR(data:), ?system ) ) AS ?systemIRI )
}
```



ASK



ASK

DOES GRAPH PATTERN EXIST?

QUERY 15: DOES THE SYSTEM DATA CREATED IN QUERY 14 EXIST?

PREFIX **rdfs:** <<http://www.w3.org/2000/01/rdf-schema#>>

PREFIX **data:** <<http://www.webstep.no/workshop/data/>>

PREFIX **ens:** <<http://www.webstep.no/workshop/ens/>>

ASK

WHERE

```
{  
  ?systemIRI a ens:System ;  
             rdfs:label ?system .  
  ?pump ens:partOfSystem ?systemIRI .  
}
```

ASK

DOES GRAPH PATTERN EXIST?

QUERY 16: DOES AT LEAST 1 PUMP THAT IS PART OF A SYSTEM AND AT A LOCATION DEPTH OF 16.0 EXIST?

PREFIX **ens:** <<http://www.webstep.no/workshop/ens/>>

ASK

WHERE

```
{  
  ?pump a ens:Pump ;  
  ens:partOfSystem ?system ;  
  ens:locationDepth [  
    ens:hasValue 16.0  
  ]  
}
```



DESCRIBE



DESCRIBE

WHAT IS KNOWN ABOUT AN INDIVIDUAL?

```
# QUERY 17: WHAT IS KNOWN ABOUT A SPECIFIC INDIVIDUAL  
PREFIX data: <http://www.webstep.no/workshop/data/>  
DESCRIBE data:50_PH50B
```

DESCRIBE BLANK NODES

```
# QUERY 18: WHAT IS KNOWN ABOUT A SPECIFIC INDIVIDUAL WITH BLANK NODES?  
PREFIX data: <http://www.webstep.no/workshop/data/>  
DESCRIBE data:50_PH50A
```

DESCRIBE

MULTIPLE INDIVIDUAL

```
# QUERY 18: WHAT IS KNOWN ABOUT A GIVEN PUMP AND ITS LOCATION DEPTH?
PREFIX data: <http://www.webstep.no/workshop/data/>
PREFIX ens: <http://www.webstep.no/workshop/ens/>
DESCRIBE ?pump ?locationDepth
WHERE
{
    ?pump a ens:Pump_PH ;
          ens:locationDepth ?locationDepth .

    FILTER(?pump = data:50_PH50B)
}
```



UPDATE



INSERT

CREATE NEW DATA

```
# QUERY 19: INSERT NEW DATA
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX data: <http://www.webstep.no/workshop/data/>
PREFIX ens: <http://www.webstep.no/workshop/ens/>
INSERT
{
  data:System50 a ens:System ;
                rdfs:label "System 50"
}
```

INSERT

PREPARATION : CREATE DATA FROM GRAPH PATTERNS

QUERY 20: PREPARATIONS FOR CREATING NEW RELATIONSHIPS

PREFIX **ens:** <<http://www.webstep.no/workshop/ens/>>

CONSTRUCT

```
{  
    ?pump ens:partOfSystem ?systemIri .  
}
```

WHERE

```
{  
    ?system a ens:System .  
    ?pump ens:partOfSystem ?systemLabel .  
  
    BIND(IF(CONTAINS(STR(?system), ?systemLabel), ?system, ?undefined) AS ?systemIri)  
}
```

INSERT

CREATE DATA FROM GRAPH PATTERNS

QUERY 21: INSERTING NEW RELATIONSHIPS

PREFIX **ens:** <<http://www.webstep.no/workshop/ens/>>

INSERT

```
{  
    ?pump ens:partOfSystem ?systemIri .  
}
```

WHERE

```
{  
    ?system a ens:System .  
    ?pump ens:partOfSystem ?systemLabel .  
  
    BIND(IF(CONTAINS(STR(?system), ?systemLabel), ?system, ?undefined) AS ?systemIri)  
}
```

DELETE

PREPARATION : DELETE DATA FROM GRAPH PATTERNS

QUERY 22: PREPARATIONS FOR DELETING OLD RELATIONSHIPS

PREFIX **ens:** <<http://www.webstep.no/workshop/ens/>>

CONSTRUCT

```
{  
    ?pump ens:partOfSystem ?system .  
}
```

WHERE

```
{  
    ?pump a ens:Pump ;  
        ens:partOfSystem ?system .  
}
```

#FILTER ISLITERAL(?system)

```
}
```


DELETE

DELETE DATA FROM GRAPH PATTERNS

QUERY 23: DELETING OLD RELATIONSHIPS

PREFIX **ens:** <<http://www.webstep.no/workshop/ens/>>

CONSTRUCT

```
{  
    ?pump ens:partOfSystem ?system .  
}
```

WHERE

```
{  
    ?pump a ens:Pump ;  
        ens:partOfSystem ?system .  
}
```

FILTER ISLITERAL(?system)

```
}
```

CONSTRUCT

REVIEWING RESULT

```
# QUERY 24(10): REVIEW THE GRAPH
CONSTRUCT { ?s ?p ?o . }
WHERE {
  ?s ?p ?o .
}
```