

# Graphical display of SPARQL queries with arq, rapper and graphviz

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## Contents

<b>Graphical display of results from SPARQL scripts for the demographics cube (DC-DEMO-sample.ttl)</b>	<b>1</b>
Get one observation and display graphically . . . . .	1

## Graphical display of results from SPARQL scripts for the demographics cube (DC-DEMO-sample.ttl)

The examples below uses `arq` from Apache Jena (<http://jena.apache.org>). To install arq - download and unpack the latest version of apache-jena from (<http://jena.apache.org/download/index.cgi>). Put the executable `arq` in the path, or invoke `arq` with the full path to the directory with `arq`.

The use of `arq` is described many places, see for example (<http://www.learningsparql.com/>).

All `arq` commands below are to be run in the directory with the sample files, which is `inst/extdata/sample-rdf` directory or `extdata/sample-rdf` depending on the whether the development version or the installed version of the package is used.

The `cd` below in each code block is included because I could not find a quick way to get the code chunk executed in that directory. knitr is flexible enough to do it, I have not yet found the right way to do it. So, ignore the repeated `cd ..`

### Get one observation and display graphically

The SPARQL query returns all triples for one observation, and stores it in the file `fordot.ttl`. The file is used as input to `rapper` and converted to the dot format, and displayed using the dot program part of Graphviz (<http://www.graphviz.org/>).

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query OneQBobobservation.rq > fordot.ttl
cat fordot.ttl
rapper -i turtle -o dot fordot.ttl > fordot.dot
dot -x -Tpdf -ograph.pdf fordot.dot
```

```
## @prefix dccc: <http://www.example.org/dc/demo/dccc/> .
## @prefix code: <http://www.example.org/dc/code/> .
## @prefix sdtms-1-3: <http://rdf.cd-disc.org/sdtm-1-3/schema#> .
## @prefix adam-2-1: <http://rdf.cd-disc.org/std/adam-2-1#> .
## @prefix owl: <http://www.w3.org/2002/07/owl#> .
## @prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
## @prefix sdtm-1-3: <http://rdf.cd-disc.org/std/sdtm-1-3#> .
```

```

## @prefix cdash-1-1: <http://rdf.cdisc.org/std/cdash-1-1#> .
## @prefix skos: <http://www.w3.org/2004/02/skos/core#> .
## @prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
## @prefix adamvr-1-2: <http://rdf.cdisc.org/std/adamvr-1-2#> .
## @prefix crnd-attribute: <http://www.example.org/dc/attribute#> .
## @prefix sdtm-1-2: <http://rdf.cdisc.org/std/sdtm-1-2#> .
## @prefix ds: <http://www.example.org/dc/demo/ds/> .
## @prefix sdtmct: <http://rdf.cdisc.org/sdtm-terminology#> .
## @prefix qb: <http://purl.org/linked-data/cube#> .
## @prefix mms: <http://rdf.cdisc.org/mms#> .
## @prefix crnd-dimension: <http://www.example.org/dc/dimension#> .
## @prefix dct: <http://purl.org/dc/terms/> .
## @prefix cdiscs: <http://rdf.cdisc.org/std/schema#> .
## @prefix cdashct: <http://rdf.cdisc.org/cdash-terminology#> .
## @prefix dcat: <http://www.w3.org/ns/dcat#> .
## @prefix prov: <http://www.w3.org/ns/prov#> .
## @prefix sdtmig-3-1-3: <http://rdf.cdisc.org/std/sdtmig-3-1-3#> .
## @prefix crnd-measure: <http://www.example.org/dc/measure#> .
## @prefix adamig-1-0: <http://rdf.cdisc.org/std/adamig-1-0#> .
## @prefix cts: <http://rdf.cdisc.org/ct/schema#> .
## @prefix pav: <http://purl.org/pav/> .
## @prefix sdtmig-3-1-2: <http://rdf.cdisc.org/std/sdtmig-3-1-2#> .
## @prefix sendig-3-0: <http://rdf.cdisc.org/std/sendig-3-0#> .
## @prefix adamct: <http://rdf.cdisc.org/adam-terminology#> .
## @prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
## @prefix sendct: <http://rdf.cdisc.org/send-terminology#> .
## @prefix rrdqbcrnd0: <http://www.example.org/rrdqbcrnd0/> .
## @prefix dc: <http://purl.org/dc/elements/1.1/> .
##
## ds:obs014 a qb:Observation ;
## rdfs:comment "Statistic for number of records/Statistics for factor with the c
## rdfs:label "14" ;
## qb:dataSet ds:dataset-DEMO ;
## crnd-attribute:cellpartno "1" ;
## crnd-attribute:colno "2" ;
## crnd-attribute:denominator "" ;
## crnd-attribute:measurefmt "%6.0f" ;
## crnd-attribute:rowno "3" ;
## crnd-attribute:unit "NA" ;
## crnd-dimension:agegr1 code:agegr1-ALL_ ;
## crnd-dimension:ethnic code:ethnic-ALL_ ;
## crnd-dimension:factor code:factor-quantity ;
## crnd-dimension:procedure code:procedure-count ;
## crnd-dimension:race code:race-ALL_ ;
## crnd-dimension:sex code:sex-M ;
## crnd-dimension:trt01a code:trt01a-Xanomeline_Low_Dose ;
## crnd-measure:measure "34"^^xsd:double .
## rapper: Parsing URI file:///home/ma/projects/rrdqbcrnd0/rrdqbcrndex/inst/extdata/sample-rdf/fordot
## rapper: Serializing with serializer dot
## rapper: Parsing returned 18 triples

```

The pdf file can then be viewed using a pdf viewer.

Alternatively, knitr supports presenting dot as show below.

```

digraph {
    rankdir = LR;
    charset="utf-8";

    "Rds:obs014" -> "Rqb:Observation" [ label="rdf:type" ];
    "Rds:obs014" -> "L14" [ label="rdfs:label" ];
    "Rds:obs014" -> "Rds:dataset-DEMO" [ label="qb:dataSet" ];
    "Rds:obs014" -> "L1|Datatype: xsd:string" [ label="crnd-attribute:cellpartno" ];
    "Rds:obs014" -> "L2|Datatype: xsd:string" [ label="crnd-attribute:colno" ];
    "Rds:obs014" -> "L" [ label="crnd-attribute:denominator" ];
    "Rds:obs014" -> "L3|Datatype: xsd:string" [ label="crnd-attribute:rowno" ];
    "Rds:obs014" -> "LNA|Datatype: xsd:string" [ label="crnd-attribute:unit" ];
    "Rds:obs014" -> "Rcode:agegr1-_ALL_" [ label="crnd-dimension:agegr1" ];
    "Rds:obs014" -> "Rcode:ethnic-_ALL_" [ label="crnd-dimension:ethnic" ];
    "Rds:obs014" -> "Rcode:factor-quantity" [ label="crnd-dimension:factor" ];
    "Rds:obs014" -> "Rcode:procedure-count" [ label="crnd-dimension:procedure" ];
    "Rds:obs014" -> "Rcode:race-_ALL_" [ label="crnd-dimension:race" ];
    "Rds:obs014" -> "Rcode:sex-M" [ label="crnd-dimension:sex" ];
    "Rds:obs014" -> "Rcode:trt01a-Xanomeline_Low_Dose" [ label="crnd-dimension:trt01a" ];
    "Rds:obs014" -> "L34|Datatype: xsd:int" [ label="crnd-measure:measure" ];

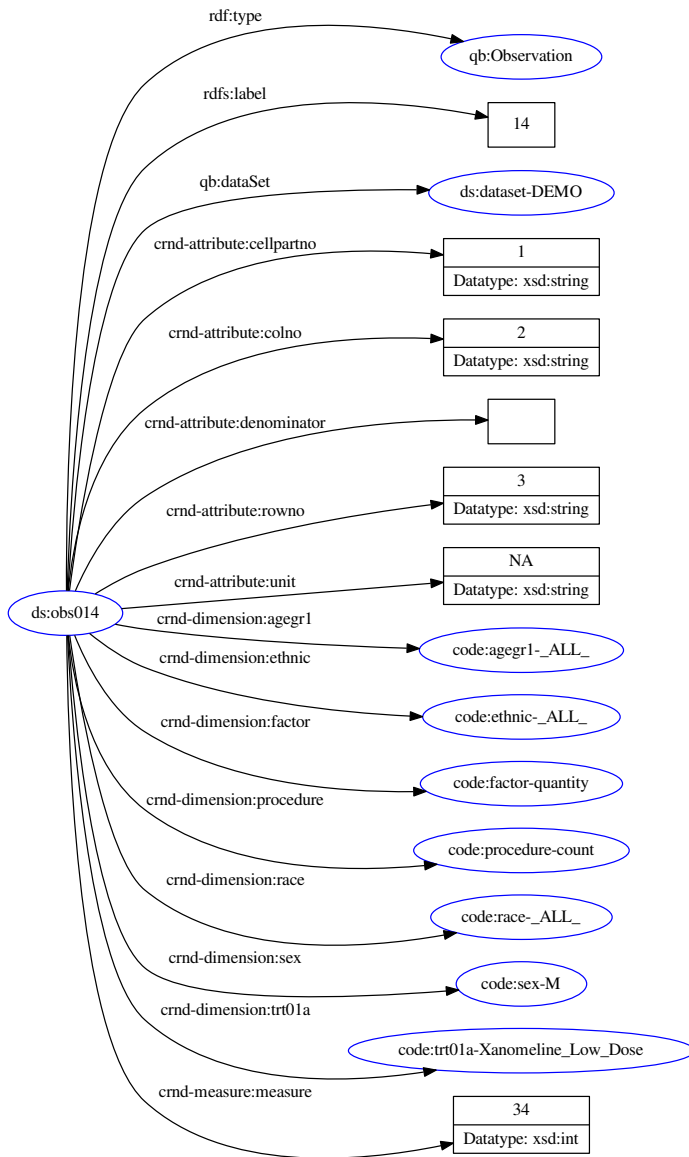
    // Resources
    "Rds:obs014" [ label="ds:obs014", shape = ellipse, color = blue ];
    "Rqb:Observation" [ label="qb:Observation", shape = ellipse, color = blue ];
    "Rds:dataset-DEMO" [ label="ds:dataset-DEMO", shape = ellipse, color = blue ];
    "Rcode:agegr1-_ALL_" [ label="code:agegr1-_ALL_", shape = ellipse, color = blue ];
    "Rcode:ethnic-_ALL_" [ label="code:ethnic-_ALL_", shape = ellipse, color = blue ];
    "Rcode:factor-quantity" [ label="code:factor-quantity", shape = ellipse, color = blue ];
    "Rcode:procedure-count" [ label="code:procedure-count", shape = ellipse, color = blue ];
    "Rcode:race-_ALL_" [ label="code:race-_ALL_", shape = ellipse, color = blue ];
    "Rcode:sex-M" [ label="code:sex-M", shape = ellipse, color = blue ];
    "Rcode:trt01a-Xanomeline_Low_Dose" [ label="code:trt01a-Xanomeline_Low_Dose", shape = ellipse, color = blue ];

    // Anonymous nodes

    // Literals
    "L14" [ label="14", shape = record ];
    "L1|Datatype: xsd:string" [ label="1|Datatype: xsd:string", shape = record ];
    "L2|Datatype: xsd:string" [ label="2|Datatype: xsd:string", shape = record ];
    "L" [ label="", shape = record ];
    "L3|Datatype: xsd:string" [ label="3|Datatype: xsd:string", shape = record ];
    "LNA|Datatype: xsd:string" [ label="NA|Datatype: xsd:string", shape = record ];
    "L34|Datatype: xsd:int" [ label="34|Datatype: xsd:int", shape = record ];

    label="\n\nModel:\n(Unknown)\n\nNamespaces:\nprov: http://www.w3.org/ns/prov#\ncrnd-dimension: http
}

```



Model:  
(Unknown)

Namespaces:

- prov: <http://www.w3.org/ns/prov#>
- crnd-dimension: <http://www.example.org/dc/dimension#>
- mms: <http://rdf.cdsc.org/mms#>
- crnd-measure: <http://www.example.org/dc/measure#>
- code: <http://www.example.org/dc/code/>
- qb: <http://purl.org/linked-data/cube#>
- dccs: <http://www.example.org/dc/demo/dccs/>
- rdfs: <http://www.w3.org/2000/01/rdf-schema#>
- dcat: <http://www.w3.org/ns/dcat#>
- pav: <http://purl.org/pav>
- dct: <http://purl.org/dc/terms/>
- xsd: <http://www.w3.org/2001/XMLSchema#>
- owl: <http://www.w3.org/2002/07/owl#>
- rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
- skos: <http://www.w3.org/2004/02/skos/core#>
- cts: <http://rdf.cdsc.org/ct/schema#>
- rrdfqbernd0: <http://www.example.org/rrdfqbernd0/>
- ds: <http://www.example.org/dc/demo/ds/>
- crnd-attribute: <http://www.example.org/dc/attribute#>