Query plans of RDF-star-based-approach for Stardog 7.9.0

Query 1

```
`— Projection(?id, ?lbl) [#77]
  `— MergeJoinOuter(?n1) [#77]
    +— MergeJoin(?n1) [#77]
    |  +— Scan[POSC](?n1, ns1:name, "XU JIE") [#20]
    |  `— Scan[PSOC](?n1, rdfs:label, ?lbl) [#560K]
    `— MergeJoin(?n1) [#77]
      +— Scan[POSC](?n1, ns1:name, "XU JIE") [#20]
      `— Scan[PSOC](?n1, ns1:node_id, ?id) [#560K]
```

Query 2

```
`— Projection(?lbl, ?country) [#433]
  `— Filter(?country != "") [#433]
    `— NaryJoin(?n) [#433]
      +— Scan[PSOC](?n, ns1:countries, ?country) [#463K]
      +— Scan[PSOC](?n, rdfs:label, ?lbl) [#560K]
      `— Scan[POSC](?n, ns1:name, "EL PORTADOR") [#9.3K]
```

Query 3

```
`— Distinct [#4]
  `— Projection(?lbl) [#196K]
    `— Scan[POC](_, rdfs:label, ?lbl) [#196K]
```

Query 4

```
`— Distinct [#11]
  `— Projection(?lbl) [#1.4M]
    `— Filter(!(isLiteral(?n1))) [#1.4M]
      `— Scan[POC](_, ?lbl, ?n1) [#2.9M]
```

Query 5

`─ Projection(?name, ?lbl) [#1]

  `─ MergeJoinOuter(?n2) [#1]

    ┼─ MergeJoin(?n2) [#1]

    │ ┼─ Scan[PSOC](?n2, rdfs:label, ?lbl) [#560K]

    │ `─ Sort(?n2) [#1]

    │   `─ MergeJoin(?n1) [#1]

    │   ┼─ Scan[POSC](?n1, ns1:name, "ORION HOUSE SERVICES (HK) LIMITED") [#1]

    │   `─ Scan[PSOC](?n1, ns1:intermediary_of, ?n2) [#214K]

    `─ Scan[PSOC](?n2, ns1:name, ?name) [#466K]

Query 6

`─ Projection(?lbl1, ?name, ?link, ?lbl2) [#1.1K]

  `─ Union [#1.1K]

    ┼─ MergeJoinOuter(?n2) [#592]

    │ ┼─ MergeJoinOuter(?n2) [#592]

    │ │ ┼─ MergeJoin(?n2) [#592]

    │ │ │ ┼─ Scan[PSOC](?n2, rdfs:label, ?lbl2) [#560K]

    │ │ │ `─ Sort(?n2) [#592]

    │ │ │   `─ NaryJoin(?n1) [#592]

    │ │ │   ┼─ Scan[POSC](?n1, ns1:name, "BEARER") [#484]

    │ │ │   ┼─ Scan[PSOC](?n1, rdfs:label, ?lbl1) [#560K]

    │ │ │   `─ Scan[PSOC](?n1, ns1:officer_of, ?n2) [#293K]

    │ │ `─ Scan[PSOC](?n2, ns1:name, ?name) [#466K]

    │ `─ Sort(?n2) [#293K]

    │   `─ MergeJoin(?wauoykqw) [#293K]

    │   ┼─ Scan[PSOC](?wauoykqw, ns1:link, ?link) [#658K]

    │   `─ Sort(?wauoykqw) [#293K]

    │   `─ Bind(GetStatement(?n1, <http://example.org/officer_of>, ?n2, ?cbqajcqt) AS ?wauoykqw) sortedBy=?n2 [#293K]

    │   `─ Scan[POSC](?n1, ns1:officer_of, ?n2) [#293K]

    `─ MergeJoinOuter(?n2) [#520]

      ┼─ MergeJoinOuter(?n2) [#520]

      │ ┼─ MergeJoin(?n2) [#520]

      │ │ ┼─ Scan[PSOC](?n2, rdfs:label, ?lbl2) [#560K]

      │ │ `─ Sort(?n2) [#520]

```
|   |      `─ NaryJoin(?n1) [#520]
|   |          +─ Scan[POSC](?n1, ns1:name, "The Bearer") [#428]
|   |          +─ Scan[PSOC](?n1, rdfs:label, ?lbl1) [#560K]
|   |          `─ Scan[PSOC](?n1, ns1:officer_of, ?n2) [#293K]
|   `─ Scan[PSOC](?n2, ns1:name, ?name) [#466K]
`─ Sort(?n2) [#293K]
   `─ MergeJoin(?qidkgbhv) [#293K]
      +─ Scan[PSOC](?qidkgbhv, ns1:link, ?link) [#658K]
      `─ Sort(?qidkgbhv) [#293K]
         `─ Bind(GetStatement(?n1, <http://example.org/officer_of>, ?n2, ?pejrvhma) AS ?qidkgbhv) sortedBy=?n2 [#293K]
            `─ Scan[POSC](?n1, ns1:officer_of, ?n2) [#293K]
```

Query 7

```
`─ Projection(?lbl1, ?link, ?lbl2, ?entity_name) [#2]
  `─ Union [#2]
    +─ MergeJoinOuter(?n2) [#1]
    |  +─ Sort(?n2) [#1]
    |  |  `─ MergeJoinOuter(?n1) [#1]
    |  |     +─ MergeJoin(?n1) [#1]
    |  |     |  +─ MergeJoin(?n1) [#74K]
    |  |     |  |  +─ Scan[POSC](?n1, ns1:name, "THE BEARER") [#71K]
    |  |     |  |  `─ Scan[PSOC](?n1, rdfs:label, ?lbl1) [#560K]
    |  |     |  `─ Sort(?n1) [#1]
    |  |     |     `─ HashJoin(?afarhfjh) [#1]
    |  |     |        +─ MergeJoin(?n2) [#80K]
    |  |     |        |  +─ Bind(GetStatement(?n1, ?r1, ?n2, ?kxpuutjp) AS ?afarhfjh) sortedBy=?n2 [#8.3M]
    |  |     |        |  |  `─ Scan[OSPC](?n1, ?r1, ?n2) [#8.3M]
    |  |     |        |  `─ MergeJoin(?n2) [#68K]
    |  |     |        |     +─ Scan[POSC](?n2, ns1:status, "Active") [#56K]
    |  |     |        |     `─ Scan[PSOC](?n2, rdfs:label, ?lbl2) [#560K]
    |  |     |        `─ Scan[POSC](?afarhfjh, ns1:end_date, "11-APR-2014") [#109]
    |  |     `─ HashJoin(?jjlazwmm) [#658K]
    |  |        +─ Bind(GetStatement(?n1, ?r1, ?n2, ?cjjdjgqn) AS ?jjlazwmm) sortedBy=?n1 [#8.3M]
    |  |        |  `─ Scan[SPOC](?n1, ?r1, ?n2) [#8.3M]
    |  |        `─ Scan[POSC](?jjlazwmm, ns1:link, ?link) [#658K]
    |  `─ Scan[PSOC](?n2, ns1:name, ?entity_name) [#466K]
    `─ MergeJoinOuter(?n2) [#1]
       +─ Sort(?n2) [#1]
```

```
|  `─ MergeJoinOuter(?n1) [#1]
|    ├─ MergeJoin(?n1) [#1]
|    |  ├─ MergeJoin(?n1) [#74K]
|    |  |  ├─ Scan[POSC](?n1, ns1:name, "THE BEARER") [#71K]
|    |  |  `─ Scan[PSOC](?n1, rdfs:label, ?lbl1) [#560K]
|    |  `─ Sort(?n1) [#11]
|    |     `─ HashJoin(?ppfrnwnt) [#11]
|    |        ├─ MergeJoin(?n2) [#132K]
|    |        |  ├─ Bind(GetStatement(?n1, ?r1, ?n2, ?zhkdxnyb) AS ?ppfrnwnt) sortedBy=?n2 [#8.3M]
|    |        |  |  `─ Scan[OSPC](?n1, ?r1, ?n2) [#8.3M]
|    |        |  `─ MergeJoin(?n2) [#113K]
|    |        |     ├─ Scan[POSC](?n2, ns1:status, "Defaulted") [#100K]
|    |        |     `─ Scan[PSOC](?n2, rdfs:label, ?lbl2) [#560K]
|    |        `─ Scan[POSC](?ppfrnwnt, ns1:end_date, "29-DEC-2009") [#852]
|    `─ HashJoin(?qejqypyp) [#658K]
|       ├─ Bind(GetStatement(?n1, ?r1, ?n2, ?arqwouuf) AS ?qejqypyp) sortedBy=?n1 [#8.3M]
|       |  `─ Scan[SPOC](?n1, ?r1, ?n2) [#8.3M]
|       `─ Scan[PSOC](?qejqypyp, ns1:link, ?link) [#658K]
`─ Scan[PSOC](?n2, ns1:name, ?entity_name) [#466K]
```

Query 8

```
`─ Projection(?lbl1, ?name, ?link, ?address) [#151K]
  `─ MergeJoinOuter(?n3) [#151K]
    ├─ Sort(?n3) [#151K]
    |  `─ MergeJoinOuter(?n1) [#151K]
    |     ├─ MergeJoinOuter(?n1) [#151K]
    |     |  ├─ MergeJoin(?n1) [#151K]
    |     |  |  ├─ Scan[PSOC](?n1, rdfs:label, ?lbl1) [#560K]
    |     |  |  `─ Scan[PSOC](?n1, ns1:registered_address, ?n3) [#151K]
    |     |  `─ Scan[PSOC](?n1, ns1:name, ?name) [#466K]
    |     `─ Sort(?n1) [#151K]
    |        `─ MergeJoin(?sjuwahye) [#151K]
    |           ├─ Scan[PSOC](?sjuwahye, ns1:link, ?link) [#658K]
    |           `─ Sort(?sjuwahye) [#151K]
    |              `─ Bind(GetStatement(?n1, <http://example.org/registered_address>, ?n3, ?njfdkkyv) AS ?sjuwahye) sortedBy=?n3 [#151K]
    |                 `─ Scan[POSC](?n1, ns1:registered_address, ?n3) [#151K]
    `─ Scan[PSOC](?n3, ns1:address, ?address) [#93K]
```

Query 9

```
`─ Projection(?lbl, ?name, ?link1, ?first_address, ?link2, ?second_address) [#76K]

  `─ MergeJoinOuter(?n3) [#76K]

    ┼─ Sort(?n3) [#76K]

    │  `─ HashJoinOuter(?n1) [#76K]

    │    ┼─ MergeJoinOuter(?n2) [#76K]

    │    │  ┼─ Sort(?n2) [#76K]

    │    │  │  `─ MergeJoinOuter(?n1) [#76K]

    │    │  │    ┼─ MergeJoinOuter(?n1) [#76K]

    │    │  │    │  ┼─ Filter(?n2 != ?n3) [#76K]

    │    │  │    │  │  `─ NaryJoin(?n1) [#151K]

    │    │  │    │  │    ┼─ Scan[PSOC](?n1, rdfs:label, ?lbl) [#560K]

    │    │  │    │  │    ┼─ Scan[PSOC](?n1, ns1:registered_address, ?n3) [#151K]

    │    │  │    │  │    `─ Scan[PSOC](?n1, ns1:registered_address, ?n2) [#151K]

    │    │  │    │  `─ Scan[PSOC](?n1, ns1:name, ?name) [#466K]

    │    │  │    `─ Sort(?n1) [#151K]

    │    │  │      `─ MergeJoin(?lfvgdopi) [#151K]

    │    │  │        ┼─ Scan[PSOC](?lfvgdopi, ns1:link, ?link1) [#658K]

    │    │  │        `─ Sort(?lfvgdopi) [#151K]

    │    │  │          `─ Bind(GetStatement(?n1, <http://example.org/registered_address>, ?n2, ?cgogbhxj) AS ?lfvgdopi)
sortedBy=?cgogbhxj [#151K]

    │    │  │            `─ Scan[PSO](?n1, ns1:registered_address, ?n2) [#151K]

    │    │  `─ Scan[PSOC](?n2, ns1:address, ?first_address) [#93K]

    │    `─ MergeJoin(?jweezjdo) [#151K]

    │      ┼─ Scan[PSOC](?jweezjdo, ns1:link, ?link2) [#658K]

    │      `─ Sort(?jweezjdo) [#151K]

    │        `─ Bind(GetStatement(?n1, <http://example.org/registered_address>, ?n3, ?wqrohpkz) AS ?jweezjdo) sortedBy=?n3 [#151K]

    │          `─ Scan[POSC](?n1, ns1:registered_address, ?n3) [#151K]

    `─ Scan[PSOC](?n3, ns1:address, ?second_address) [#93K]
```

Query 10

`─ Projection(?link1, ?link2, ?address) [#169K]

  `─ MergeJoinOuter(?n3) [#169K]

    +─ Sort(?n3) [#169K]

    │   `─ HashJoinOuter(?n3) [#169K]

    │   +─ MergeJoinOuter(?n1) [#169K]

    │   │   +─ HashJoin(?n3) [#169K]

    │   │   │   +─ MergeJoin(?n1) [#146K]

    │   │   │   │   +─ Scan[POSC](?n1, rdfs:label, "officer") [#238K]

    │   │   │   │   `─ Scan[PSOC](?n1, ns1:registered_address, ?n3) [#151K]

    │   │   │   `─ MergeJoin(?n2) [#5.4K]

    │   │   │   +─ Scan[POSC](?n2, rdfs:label, "entity") [#214K]

    │   │   │   `─ Scan[PSOC](?n2, ns1:registered_address, ?n3) [#151K]

    │   │   `─ Sort(?n1) [#151K]

    │   │   `─ MergeJoin(?yyhvqlyr) [#151K]

    │   │   +─ Scan[PSOC](?yyhvqlyr, ns1:link, ?link1) [#658K]

    │   │   `─ Sort(?yyhvqlyr) [#151K]

    │   │   `─ Bind(GetStatement(?n1, <http://example.org/registered_address>, ?n3, ?kxkvxbmt) AS ?yyhvqlyr) sortedBy=?n3 [#151K]

    │   │   `─ Scan[POSC](?n1, ns1:registered_address, ?n3) [#151K]

    │   `─ MergeJoin(?ribftlih) [#151K]

    │   +─ Scan[PSOC](?ribftlih, ns1:link, ?link2) [#658K]

    │   `─ Sort(?ribftlih) [#151K]

    │   `─ Bind(GetStatement(?n2, <http://example.org/registered_address>, ?n3, ?cuolrjtt) AS ?ribftlih) sortedBy=?n2 [#151K]

    │   `─ Scan[PSOC](?n2, ns1:registered_address, ?n3) [#151K]

    `─ Scan[PSOC](?n3, ns1:address, ?address) [#93K]

Query 11

```
`─ Projection(?name, ?valid, ?sourceID) [#68]
  `─ MergeJoinOuter(?n1) [#68]
    ┼─ MergeJoinOuter(?n1) [#68]
    │  ┼─ MergeJoinOuter(?n1) [#68]
    │  │  ┼─ Sort(?n1) [#68]
    │  │  │  `─ MergeJoin(?n4) [#68]
    │  │  │    ┼─ Scan[POSC](?n4, rdfs:label, "officer") [#238K]
    │  │  │    `─ Sort(?n4) [#332]
    │  │  │      `─ MergeJoin(?n3) [#332]
    │  │  │        ┼─ MergeJoin(?n3) [#110K]
    │  │  │        │  ┼─ Scan[POSC](?n3, rdfs:label, "address") [#93K]
    │  │  │        │  `─ Scan[OSPC](?n4, ?r3, ?n3) [#8.3M]
    │  │  │        `─ Sort(?n3) [#21K]
    │  │  │          `─ MergeJoin(?n2) [#21K]
    │  │  │            ┼─ MergeJoin(?n2) [#1.5M]
    │  │  │            │  ┼─ Scan[POSC](?n2, rdfs:label, "entity") [#214K]
    │  │  │            │  `─ Scan[SPOC](?n2, ?r2, ?n3) [#8.3M]
    │  │  │            `─ Sort(?n2) [#97K]
    │  │  │              `─ MergeJoin(?n1) [#97K]
    │  │  │                ┼─ Scan[POSC](?n1, rdfs:label, "intermediary") [#14K]
    │  │  │                `─ Scan[SPOC](?n1, ?r1, ?n2) [#8.3M]
    │  │  `─ HashJoin(?xpdilqqo) [#1.2M]
    │  │    ┼─ Bind(GetStatement(?n1, ?r1, ?n2, ?cczgushn) AS ?xpdilqqo) sortedBy=?n1 [#8.3M]
    │  │    │  `─ Scan[SPOC](?n1, ?r1, ?n2) [#8.3M]
    │  │    `─ Scan[PSOC](?xpdilqqo, ns1:valid_until, ?valid) [#1.2M]
    │  `─ HashJoin(?hadzjblg) [#1.2M]
    │    ┼─ Bind(GetStatement(?n1, ?r1, ?n2, ?nxmlgnrc) AS ?hadzjblg) sortedBy=?n1 [#8.3M]
    │    │  `─ Scan[SPOC](?n1, ?r1, ?n2) [#8.3M]
    │    `─ Scan[PSOC](?hadzjblg, ns1:sourceID, ?sourceID) [#1.2M]
    `─ Scan[PSOC](?n1, ns1:name, ?name) [#466K]
```

Query 12

```
`─ Projection(?officer_name, ?link1, ?officer2_name, ?link2, ?entity_name, ?intermediary_name, ?valid_until, ?e_name) [#36]

  `─ MergeJoinOuter(?n6) [#36]

    ┼─ Sort(?n6) [#36]

    │  `─ HashJoinOuter(?n5) [#36]

    │    ┼─ MergeJoinOuter(?n5) [#36]

    │    │  ┼─ Sort(?n5) [#36]

    │    │  │  `─ MergeJoinOuter(?n4) [#36]

    │    │  │    ┼─ Sort(?n4) [#36]

    │    │  │    │  `─ MergeJoinOuter(?n2) [#36]

    │    │  │    │    ┼─ MergeJoinOuter(?n2) [#36]

    │    │  │    │    │  ┼─ Sort(?n2) [#36]

    │    │  │    │    │  │  `─ MergeJoinOuter(?n1) [#36]

    │    │  │    │    │  │    ┼─ MergeJoinOuter(?n1) [#36]

    │    │  │    │    │  │    │  ┼─ Sort(?n1) [#36]

    │    │  │    │    │  │    │  │  `─ Filter(?n4 != ?n6) [#36]

    │    │  │    │    │  │    │  │    `─ HashJoin(?n5) [#73]

    │    │  │    │    │  │    │  │      ┼─ MergeJoin(?n6) [#215K]

    │    │  │    │    │  │    │  │      │  ┼─ Scan[POSC](?n6, rdfs:label, "entity") [#214K]

    │    │  │    │    │  │    │  │      │  `─ Scan[POSC](?n5, ns1:intermediary_of, ?n6) [#214K]

    │    │  │    │    │  │    │  │      `─ MergeJoin(?n5) [#4]

    │    │  │    │    │  │    │  │        ┼─ Scan[POSC](?n5, rdfs:label, "intermediary") [#14K]

    │    │  │    │    │  │    │  │        `─ Sort(?n5) [#4]

    │    │  │    │    │  │    │  │          `─ MergeJoin(?n4) [#4]

    │    │  │    │    │  │    │  │            ┼─ MergeJoin(?n4) [#215K]

    │    │  │    │    │  │    │  │            │  ┼─ Scan[POSC](?n4, rdfs:label, "entity") [#214K]

    │    │  │    │    │  │    │  │            │  `─ Scan[POSC](?n5, ns1:intermediary_of, ?n4) [#214K]

    │    │  │    │    │  │    │  │            `─ Sort(?n4) [#4]

    │    │  │    │    │  │    │  │              `─ MergeJoin(?n1) [#4]

    │    │  │    │    │  │    │  │                ┼─ Scan[POSC](?n1, rdfs:label, "officer") [#238K]

    │    │  │    │    │  │    │  │                `─ Sort(?n1) [#4]

    │    │  │    │    │  │    │  │                  `─ HashJoin(?n2) [#4]

    │    │  │    │    │  │    │  │                    ┼─ MergeJoin(?n3) [#151K]

    │    │  │    │    │  │    │  │                    │  ┼─ Scan[POSC](?n3, rdfs:label, "address") [#93K]

    │    │  │    │    │  │    │  │                    │  `─ Scan[POSC](?n2, ns1:registered_address, ?n3) [#151K]

    │    │  │    │    │  │    │  │                    `─ MergeJoin(?n2) [#6]

    │    │  │    │    │  │    │  │                      ┼─ Scan[PSOC](?n2, ns1:officer_of, ?n4) [#293K]
```

```
|   |   |   |   |   |   |   |                              `─ MergeJoin(?n2) [#922]
|   |   |   |   |   |   |   |                        ┼─ Scan[POSC](?n2, rdfs:label, "officer") [#238K]
|   |   |   |   |   |   |   |                        `─ Scan[POSC](?n1, ns1:officer_of, ?n2) [#293K]
|   |   |   |   |   |   |   `─ Scan[PSOC](?n1, ns1:name, ?officer_name) [#466K]
|   |   |   |   |   |   `─ Sort(?n1) [#293K]
|   |   |   |   |   |     `─ MergeJoin(?ejoaaaig) [#293K]
|   |   |   |   |   |        ┼─ Scan[PSOC](?ejoaaaig, ns1:link, ?link1) [#658K]
|   |   |   |   |   |        `─ Sort(?ejoaaaig) [#293K]
|   |   |   |   |   |          `─ Bind(GetStatement(?n1, <http://example.org/officer_of>, ?n2, ?bakaxjpm) AS ?ejoaaaig)
sortedBy=?n2 [#293K]
|   |   |   |   |   |            `─ Scan[POSC](?n1, ns1:officer_of, ?n2) [#293K]
|   |   |   |   |   `─ Scan[PSOC](?n2, ns1:name, ?officer2_name) [#466K]
|   |   |   |   `─ Sort(?n2) [#293K]
|   |   |   |     `─ MergeJoin(?gslglohp) [#293K]
|   |   |   |        ┼─ Scan[PSOC](?gslglohp, ns1:link, ?link2) [#658K]
|   |   |   |        `─ Sort(?gslglohp) [#293K]
|   |   |   |          `─ Bind(GetStatement(?n2, <http://example.org/officer_of>, ?n4, ?lyrixnpm) AS ?gslglohp) sortedBy=?n4
[#293K]
|   |   |   |            `─ Scan[POSC](?n2, ns1:officer_of, ?n4) [#293K]
|   |   |   `─ Scan[PSOC](?n4, ns1:name, ?entity_name) [#466K]
|   |   `─ Scan[PSOC](?n5, ns1:name, ?intermediary_name) [#466K]
|   `─ MergeJoin(?xqfzuejz) [#214K]
|      ┼─ Scan[PSOC](?xqfzuejz, ns1:valid_until, ?valid_until) [#1.2M]
|      `─ Sort(?xqfzuejz) [#214K]
|        `─ Bind(GetStatement(?n5, <http://example.org/intermediary_of>, ?n4, ?zvipvkwu) AS ?xqfzuejz) sortedBy=?n5 [#214K]
|          `─ Scan[PSOC](?n5, ns1:intermediary_of, ?n4) [#214K]
`─ Scan[PSOC](?n6, ns1:name, ?e_name) [#466K]
```