Query plans of RDF-based-approach 2 for Stardog 7.9.0

Query 1

`─ Projection(?id, ?lbl) [#84]
  `─ MergeJoinOuter(?n1) [#84]
    ┼─ MergeJoin(?n1) [#84]
    │ ┼─ Scan[POSC](?n1, ns1:name, "XU JIE") [#18]
    │ `─ Scan[PSOC](?n1, node:label, ?lbl) [#560K]
    `─ MergeJoin(?n1) [#84]
      ┼─ Scan[POSC](?n1, ns1:name, "XU JIE") [#18]
      `─ Scan[PSOC](?n1, ns1:node_id, ?id) [#560K]

Query 2

`─ Projection(?lbl, ?country) [#4.4K]
  `─ Filter(?country != "") [#4.4K]
    `─ NaryJoin(?n) [#4.4K]
      ┼─ Scan[PSOC](?n, node:label, ?lbl) [#560K]
      ┼─ Scan[PSOC](?n, ns1:countries, ?country) [#463K]
      `─ Scan[POSC](?n, ns1:name, "EL PORTADOR") [#9.3K]

Query 3

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

Query 4

`─ Distinct [#3]
  `─ Projection(?lbl) [#236K]
    `─ Scan[POC](_, edge:label, ?lbl) [#236K]

Query 5

`— Projection(?name, ?lbl) [#1]

  `— MergeJoinOuter(?n2) [#1]

    +— MergeJoin(?n2) [#1]

    | +— Scan[PSOC](?n2, node:label, ?lbl) [#560K]

    | `— Sort(?n2) [#1]

    | `— MergeJoin(?r1) [#1]

    | +— MergeJoin(?r1) [#214K]

    | | +— Scan[POSC](?r1, edge:label, "intermediary_of") [#214K]

    | | `— Scan[PSOC](?r1, ns1:PointsTo, ?n2) [#674K]

    | `— Sort(?r1) [#2]

    | `— MergeJoin(?n1) [#2]

    | +— Scan[POSC](?n1, ns1:name, "ORION HOUSE SERVICES (HK) LIMITED") [#1]

    | `— Scan[PSOC](?n1, ns1:InRelationTo, ?r1) [#674K]

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

Query 6

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

  `— Union [#1.1K]

    +— MergeJoinOuter(?r1) [#604]

    | +— Sort(?r1) [#604]

    | | `— MergeJoinOuter(?n2) [#604]

    | | +— Sort(?n2) [#604]

    | | | `— MergeJoin(?n1) [#604]

    | | | +— Scan[PSOC](?n1, node:label, ?lbl1) [#560K]

    | | | `— Sort(?n1) [#604]

    | | | `— MergeJoin(?n2) [#604]

    | | | +— Scan[PSOC](?n2, node:label, ?lbl2) [#560K]

    | | | `— Sort(?n2) [#604]

    | | | `— MergeJoin(?r1) [#604]

    | | | +— MergeJoin(?r1) [#309K]

    | | | | +— Scan[POSC](?r1, edge:label, "officer_of") [#309K]

    | | | | `— Scan[PSOC](?r1, ns1:PointsTo, ?n2) [#674K]

    | | | `— Sort(?r1) [#1.3K]

    | | | `— MergeJoin(?n1) [#1.3K]

    | | | +— Scan[POSC](?n1, ns1:name, "BEARER") [#482]

    | | | `— Scan[PSOC](?n1, ns1:InRelationTo, ?r1) [#674K]

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

```
|   `─ Scan[PSOC](?r1, ns1:link, ?link) [#674K]

`─ MergeJoinOuter(?r1) [#483]

  ┼─ Sort(?r1) [#483]

  |   `─ MergeJoinOuter(?n2) [#483]

  |     ┼─ Sort(?n2) [#483]

  |     |   `─ MergeJoin(?n1) [#483]

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

  |     |     `─ Sort(?n1) [#483]

  |     |         `─ MergeJoin(?n2) [#483]

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

  |     |           `─ Sort(?n2) [#483]

  |     |               `─ MergeJoin(?r1) [#483]

  |     |                 ┼─ MergeJoin(?r1) [#309K]

  |     |                 |   ┼─ Scan[POSC](?r1, edge:label, "officer_of") [#309K]

  |     |                 |   `─ Scan[PSOC](?r1, ns1:PointsTo, ?n2) [#674K]

  |     |                 `─ Sort(?r1) [#1.1K]

  |     |                     `─ MergeJoin(?n1) [#1.1K]

  |     |                       ┼─ Scan[POSC](?n1, ns1:name, "The Bearer") [#426]

  |     |                       `─ Scan[PSOC](?n1, ns1:InRelationTo, ?r1) [#674K]

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

  `─ Scan[PSOC](?r1, ns1:link, ?link) [#674K]
```

Query 7

```
`─ Projection(?lbl1, ?link, ?lbl2, ?entity_name) [#58]

  `─ Union [#58]

    ┼─ MergeJoinOuter(?n2) [#3]

    |   ┼─ Sort(?n2) [#3]

    |   |   `─ MergeJoinOuter(?r1) [#3]

    |   |     ┼─ Sort(?r1) [#3]

    |   |     |   `─ MergeJoin(?n1) [#3]

    |   |     |     ┼─ MergeJoin(?n1) [#96K]

    |   |     |     |   ┼─ Scan[POSC](?n1, ns1:name, "THE BEARER") [#71K]

    |   |     |     |   `─ Scan[PSOC](?n1, node:label, ?lbl1) [#560K]

    |   |     |     `─ Sort(?n1) [#13]

    |   |     |         `─ MergeJoin(?n2) [#13]

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

    |   |     |           `─ MergeJoin(?n2) [#32]

    |   |     |               ┼─ Scan[POSC](?n2, ns1:status, "Active") [#56K]
```

```
| | |          `─ Sort(?n2) [#109]
| | |            `─ MergeJoin(?r1) [#109]
| | |              +─ Scan[PSOC](?r1, ns1:PointsTo, ?n2) [#674K]
| | |              `─ MergeJoin(?r1) [#112]
| | |                +─ Scan[POSC](?r1, ns1:end_date, "11-APR-2014") [#113]
| | |                `─ Scan[POSC](?n1, ns1:InRelationTo, ?r1) [#674K]
| |    `─ MergeJoin(?r1) [#110]
| |      +─ Scan[POSC](?r1, ns1:end_date, "11-APR-2014") [#113]
| |      `─ Scan[PSOC](?r1, ns1:link, ?link) [#674K]
|  `─ Scan[PSOC](?n2, ns1:name, ?entity_name) [#466K]
`─ MergeJoinOuter(?n2) [#54]
  +─ Sort(?n2) [#54]
  | `─ MergeJoinOuter(?r1) [#54]
  |   +─ Sort(?r1) [#54]
  |   | `─ MergeJoin(?n2) [#54]
  |   |   +─ Scan[PSOC](?n2, node:label, ?lbl2) [#560K]
  |   |   `─ MergeJoin(?n2) [#80]
  |   |     +─ Scan[POSC](?n2, ns1:status, "Defaulted") [#100K]
  |   |     `─ Sort(?n2) [#270]
  |   |       `─ MergeJoin(?r1) [#270]
  |   |         +─ Scan[PSOC](?r1, ns1:PointsTo, ?n2) [#674K]
  |   |         `─ Sort(?r1) [#243]
  |   |           `─ MergeJoin(?n1) [#243]
  |   |             +─ MergeJoin(?n1) [#96K]
  |   |             | +─ Scan[POSC](?n1, ns1:name, "THE BEARER") [#71K]
  |   |             | `─ Scan[PSOC](?n1, node:label, ?lbl1) [#560K]
  |   |             `─ Sort(?n1) [#857]
  |   |               `─ MergeJoin(?r1) [#857]
  |   |                 +─ Scan[POSC](?r1, ns1:end_date, "29-DEC-2009") [#857]
  |   |                 `─ Scan[POSC](?n1, ns1:InRelationTo, ?r1) [#674K]
  |   `─ Scan[PSOC](?r1, ns1:link, ?link) [#674K]
  `─ Scan[PSOC](?n2, ns1:name, ?entity_name) [#466K]
```

Query 8

```
`─ Projection(?lbl1, ?name, ?link, ?address) [#151K]
  `─ MergeJoinOuter(?n3) [#151K]
    +─ Sort(?n3) [#151K]
    | `─ MergeJoinOuter(?r1) [#151K]
```

```
|    +— Sort(?r1) [#151K]
|    |  `— MergeJoinOuter(?n1) [#151K]
|    |     +— MergeJoin(?n1) [#151K]
|    |     |  +— Scan[PSOC](?n1, node:label, ?lbl1) [#560K]
|    |     |  `— Sort(?n1) [#151K]
|    |     |     `— MergeJoin(?r1) [#151K]
|    |     |        +— Scan[POSC](?n1, ns1:InRelationTo, ?r1) [#674K]
|    |     |        `— MergeJoin(?r1) [#151K]
|    |     |           +— Scan[POSC](?r1, edge:label, "registered_address") [#151K]
|    |     |           `— Scan[PSOC](?r1, ns1:PointsTo, ?n3) [#674K]
|    |     `— Scan[PSOC](?n1, ns1:name, ?name) [#466K]
|    `— Scan[PSOC](?r1, ns1:link, ?link) [#674K]
`— Scan[PSOC](?n3, ns1:address, ?address) [#93K]
```

Query 9

```
`— Projection(?lbl, ?name, ?link1, ?first_address, ?link2, ?second_address) [#107K]
  `— MergeJoinOuter(?n3) [#107K]
    +— Sort(?n3) [#107K]
    |  `— MergeJoinOuter(?r2) [#107K]
    |     +— Sort(?r2) [#107K]
    |     |  `— MergeJoinOuter(?n2) [#107K]
    |     |     +— Sort(?n2) [#107K]
    |     |     |  `— MergeJoinOuter(?r1) [#107K]
    |     |     |     +— Sort(?r1) [#107K]
    |     |     |     |  `— MergeJoinOuter(?n1) [#107K]
    |     |     |     |     +— Filter(?n2 != ?n3) [#107K]
    |     |     |     |     |  `— MergeJoin(?n1) [#214K]
    |     |     |     |     |     +— MergeJoin(?n1) [#151K]
    |     |     |     |     |     |  +— Scan[PSOC](?n1, node:label, ?lbl) [#560K]
    |     |     |     |     |     |  `— Sort(?n1) [#151K]
    |     |     |     |     |     |     `— MergeJoin(?r2) [#151K]
    |     |     |     |     |     |        +— Scan[POSC](?n1, ns1:InRelationTo, ?r2) [#674K]
    |     |     |     |     |     |        `— MergeJoin(?r2) [#151K]
    |     |     |     |     |     |           +— Scan[POSC](?r2, edge:label, "registered_address") [#151K]
    |     |     |     |     |     |           `— Scan[PSOC](?r2, ns1:PointsTo, ?n3) [#674K]
    |     |     |     |     |     `— Sort(?n1) [#151K]
    |     |     |     |     |        `— MergeJoin(?r1) [#151K]
```

```
|   |   |   |   |   |       +─ Scan[POSC](?n1, ns1:InRelationTo, ?r1) [#674K]

|   |   |   |   |   |       `─ MergeJoin(?r1) [#151K]

|   |   |   |   |   |           +─ Scan[POSC](?r1, edge:label, "registered_address") [#151K]

|   |   |   |   |   |           `─ Scan[PSOC](?r1, ns1:PointsTo, ?n2) [#674K]

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

|   |   |   `─ Scan[PSOC](?r1, ns1:link, ?link1) [#674K]

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

|   `─ Scan[PSOC](?r2, ns1:link, ?link2) [#674K]

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

Query 10

```
`─ Projection(?link1, ?link2, ?address) [#418K]

  `─ MergeJoinOuter(?n3) [#418K]

    +─ Sort(?n3) [#418K]

    |   `─ MergeJoinOuter(?r2) [#418K]

    |     +─ Sort(?r2) [#418K]

    |     |   `─ MergeJoinOuter(?r1) [#418K]

    |     |     +─ Sort(?r1) [#418K]

    |     |     |   `─ HashJoin(?n3) [#418K]

    |     |     |     +─ MergeJoin(?n1) [#150K]

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

    |     |     |     |   `─ Sort(?n1) [#151K]

    |     |     |     |     `─ MergeJoin(?r1) [#151K]

    |     |     |     |       +─ Scan[POSC](?n1, ns1:InRelationTo, ?r1) [#674K]

    |     |     |     |       `─ MergeJoin(?r1) [#151K]

    |     |     |     |         +─ Scan[POSC](?r1, edge:label, "registered_address") [#151K]

    |     |     |     |         `─ Scan[PSOC](?r1, ns1:PointsTo, ?n3) [#674K]

    |     |     |     `─ MergeJoin(?r2) [#126K]

    |     |     |       +─ MergeJoin(?r2) [#151K]

    |     |     |       |   +─ Scan[POSC](?r2, edge:label, "registered_address") [#151K]

    |     |     |       |   `─ Scan[PSOC](?r2, ns1:PointsTo, ?n3) [#674K]

    |     |     |       `─ Sort(?r2) [#561K]

    |     |     |         `─ MergeJoin(?n2) [#561K]

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

    |     |     |           `─ Scan[PSOC](?n2, ns1:InRelationTo, ?r2) [#674K]

    |     |   `─ Scan[PSOC](?r1, ns1:link, ?link1) [#674K]

    |   `─ Scan[PSOC](?r2, ns1:link, ?link2) [#674K]
```

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

Query 11

`── Projection(?name, ?valid, ?sourceID) [#3.0K]

  `── MergeJoinOuter(?n1) [#3.0K]

    ┼── Sort(?n1) [#3.0K]

    │ `── MergeJoinOuter(?r1) [#3.0K]

    │   ┼── MergeJoinOuter(?r1) [#3.0K]

    │   │ ┼── Sort(?r1) [#3.0K]

    │   │ │ `── MergeJoin(?n4) [#3.0K]

    │   │   ┼── Scan[POSC](?n4, node:label, "officer") [#238K]

    │   │ `── Sort(?n4) [#3.0K]

    │   │   `── MergeJoin(?n1) [#3.0K]

    │   │   ┼── Scan[POSC](?n1, node:label, "intermediary") [#14K]

    │   │   `── Sort(?n1) [#3.6K]

    │   │   `── MergeJoin(?r1) [#3.6K]

    │   │   ┼── Scan[POSC](?n1, ns1:InRelationTo, ?r1) [#674K]

    │   │   `── Sort(?r1) [#3.6K]

    │   │   `── HashJoin(?n3) [#3.6K]

    │   │   ┼── MergeJoin(?r3) [#153K]

    │   │   │ ┼── Scan[POSC](?n4, ns1:InRelationTo, ?r3) [#674K]

    │   │   │ `── Sort(?r3) [#153K]

    │   │   │ `── MergeJoin(?n3) [#153K]

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

    │   │   │   `── Scan[POSC](?r3, ns1:PointsTo, ?n3) [#674K]

    │   │   `── MergeJoin(?r2) [#9.8K]

    │   │   ┼── Scan[PSOC](?r2, ns1:PointsTo, ?n3) [#674K]

    │   │   `── Sort(?r2) [#9.8K]

    │   │   `── MergeJoin(?n2) [#9.8K]

    │   │   ┼── Scan[PSOC](?n2, ns1:InRelationTo, ?r2) [#674K]

    │   │   `── MergeJoin(?n2) [#525K]

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

    │   │   `── Scan[POSC](?r1, ns1:PointsTo, ?n2) [#674K]

    │ │ `── Scan[PSOC](?r1, ns1:valid_until, ?valid) [#1.2M]

    │ `── Scan[PSOC](?r1, 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) [#176]

  `─ MergeJoinOuter(?n6) [#176]

    ┼─ Sort(?n6) [#176]

    │ `─ MergeJoinOuter(?r4) [#176]

    │   ┼─ Sort(?r4) [#176]

    │   │ `─ MergeJoinOuter(?n5) [#176]

    │   │   ┼─ Sort(?n5) [#176]

    │   │   │ `─ MergeJoinOuter(?n4) [#176]

    │   │   │   ┼─ Sort(?n4) [#176]

    │   │   │   │ `─ MergeJoinOuter(?r3) [#176]

    │   │   │   │   ┼─ Sort(?r3) [#176]

    │   │   │   │   │ `─ MergeJoinOuter(?n2) [#176]

    │   │   │   │   │   ┼─ Sort(?n2) [#176]

    │   │   │   │   │   │ `─ MergeJoinOuter(?r1) [#176]

    │   │   │   │   │   │   ┼─ Sort(?r1) [#176]

    │   │   │   │   │   │   │ `─ MergeJoinOuter(?n1) [#176]

    │   │   │   │   │   │   │   ┼─ Sort(?n1) [#176]

    │   │   │   │   │   │   │   │ `─ Filter(?n6 != ?n4) [#176]

    │   │   │   │   │   │   │   │   `─ HashJoin(?n5) [#353]

    │   │   │   │   │   │   │   │   ┼─ MergeJoin(?n6) [#167K]

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

    │   │   │   │   │   │   │   │   │ `─ Sort(?n6) [#214K]

    │   │   │   │   │   │   │   │   `─ MergeJoin(?r5) [#214K]

    │   │   │   │   │   │   │   │   ┼─ Scan[POSC](?n5, ns1:InRelationTo, ?r5) [#674K]

    │   │   │   │   │   │   │   │   `─ MergeJoin(?r5) [#214K]

    │   │   │   │   │   │   │   │   ┼─ Scan[POSC](?r5, edge:label, "intermediary_of") [#214K]

    │   │   │   │   │   │   │   │   `─ Scan[PSOC](?r5, ns1:PointsTo, ?n6) [#674K]

    │   │   │   │   │   │   │   `─ HashJoin(?r4) [#193]

    │   │   │   │   │   │   │   ┼─ MergeJoin(?n5) [#558K]

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

    │   │   │   │   │   │   │   │ `─ Scan[PSOC](?n5, ns1:InRelationTo, ?r4) [#674K]

    │   │   │   │   │   │   │   `─ MergeJoin(?n4) [#234]

    │   │   │   │   │   │   │   ┼─ MergeJoin(?n4) [#167K]

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

    │   │   │   │   │   │   │   │ `─ Sort(?n4) [#214K]

    │   │   │   │   │   │   │   `─ MergeJoin(?r4) [#214K]

```
|  |  |  |  |  |  |  |  |          |      +— Scan[POSC](?r4, edge:label, "intermediary_of") [#214K]
|  |  |  |  |  |  |  |  |          |      `— Scan[PSOC](?r4, ns1:PointsTo, ?n4) [#674K]
|  |  |  |  |  |  |  |  |          `— Sort(?n4) [#385]
|  |  |  |  |  |  |  |  |            `— HashJoin(?n2) [#385]
|  |  |  |  |  |  |  |  |              +— MergeJoin(?r3) [#309K]
|  |  |  |  |  |  |  |  |              |  +— Scan[POSC](?n2, ns1:InRelationTo, ?r3) [#674K]
|  |  |  |  |  |  |  |  |              |  `— MergeJoin(?r3) [#309K]
|  |  |  |  |  |  |  |  |              |    +— Scan[POSC](?r3, edge:label, "officer_of") [#309K]
|  |  |  |  |  |  |  |  |              |    `— Scan[PSOC](?r3, ns1:PointsTo, ?n4) [#674K]
|  |  |  |  |  |  |  |  |              `— MergeJoin(?n1) [#132]
|  |  |  |  |  |  |  |  |                +— Scan[POSC](?n1, node:label, "officer") [#238K]
|  |  |  |  |  |  |  |  |                `— Sort(?n1) [#133]
|  |  |  |  |  |  |  |  |                  `— MergeJoin(?n2) [#133]
|  |  |  |  |  |  |  |  |                    +— MergeJoin(?n2) [#34K]
|  |  |  |  |  |  |  |  |                    |  +— Scan[POSC](?n2, node:label, "officer") [#238K]
|  |  |  |  |  |  |  |  |                    |  `— Sort(?n2) [#34K]
|  |  |  |  |  |  |  |  |                    |    `— MergeJoin(?n3) [#34K]
|  |  |  |  |  |  |  |  |                    |      +— Scan[POSC](?n3, node:label, "address") [#93K]
|  |  |  |  |  |  |  |  |                    |      `— Sort(?n3) [#151K]
|  |  |  |  |  |  |  |  |                    |        `— MergeJoin(?r2) [#151K]
|  |  |  |  |  |  |  |  |                    |          +— Scan[POSC](?n2, ns1:InRelationTo, ?r2) [#674K]
|  |  |  |  |  |  |  |  |                    |          `— MergeJoin(?r2) [#151K]
|  |  |  |  |  |  |  |  |                    |            +— Scan[POSC](?r2, edge:label, "registered_address") [#151K]
|  |  |  |  |  |  |  |  |                    |            `— Scan[PSOC](?r2, ns1:PointsTo, ?n3) [#674K]
|  |  |  |  |  |  |  |  |                    `— Sort(?n2) [#309K]
|  |  |  |  |  |  |  |  |                      `— MergeJoin(?r1) [#309K]
|  |  |  |  |  |  |  |  |                        +— Scan[POSC](?n1, ns1:InRelationTo, ?r1) [#674K]
|  |  |  |  |  |  |  |  |                        `— MergeJoin(?r1) [#309K]
|  |  |  |  |  |  |  |  |                          +— Scan[POSC](?r1, edge:label, "officer_of") [#309K]
|  |  |  |  |  |  |  |  |                          `— Scan[PSOC](?r1, ns1:PointsTo, ?n2) [#674K]
|  |  |  |  |  |  |  |  `— Scan[PSOC](?n1, ns1:name, ?officer_name) [#466K]
|  |  |  |  |  |  |  `— Scan[PSOC](?r1, ns1:link, ?link1) [#674K]
|  |  |  |  |  |  `— Scan[PSOC](?n2, ns1:name, ?officer2_name) [#466K]
|  |  |  |  |  `— Scan[PSOC](?r3, ns1:link, ?link2) [#674K]
|  |  |  |  `— Scan[PSOC](?n4, ns1:name, ?entity_name) [#466K]
|  |  |  `— Scan[PSOC](?n5, ns1:name, ?intermediary_name) [#466K]
|  |  `— Scan[PSOC](?r4, ns1:valid_until, ?valid_until) [#1.2M]
|  `— Scan[PSOC](?n6, ns1:name, ?e_name) [#466K]
```