Estimation (theoretical and experimental) of the computational complexity of a query execution to a multilevel TN model relative to a one-level model.

Request #1 – Select node using the identifier

Request #2 – Select of related elements (obtaining elements taking into account the hierarchy)

Request #3 – Select of related items using a filter

Request #4 – Select of related items with filtering and grouping

Request #5 – Substring search

Number of KG nodes	Model type	Model parameters		Number of KG triples	Time of RDF/XML data loading	Request #1 Execution time	Request #2 Execution time	Request #3 Execution time	Request #4 Execution time	Request #5 Execution time
		Number of levels	Source models linked levels							
100к	One-level model			302к	4,0sec	176ms	187ms	935ms	686ms	637ms
	Hierarchical model	3 levels	3-3	219к	3,1sec	163ms	204ms	300ms	250ms	227ms
			2-3	219k	2,8sec	149ms	191ms	209ms	323ms	265ms
		4 levels	2-4	219k	3,1sec	180ms	211ms	291ms	271ms	238ms
		5 levels	2-5	219k	3,2sec	195ms	230ms	415ms	582ms	254ms
1M	One-level model			3,0M	35,8sec	253ms	230ms	4sec, 696ms	4sec, 288ms	4sec, 85ms
	Hierarchical model	3 levels	3-3	2,0M	25,7sec	161ms	219ms	263ms	208ms	213ms
			2-3	2,0M	22,1sec	162ms	221ms	374ms	310ms	685ms
		4 levels	2-4	2,0M	21,1sec	182ms	284ms	428ms	359ms	676ms
		5 levels	2-5	20,0M	23,0sec	193ms	277ms	769ms	779ms	526ms
5M	One-level model			15,0M	184,8sec	316ms	1sec, 567ms	23sec, 605ms	22sec, 892ms	20sec, 991ms
	Hierarchical model	3 levels	3-3	10,0M	111,3sec	179ms	794ms	768ms	239ms	244ms
			2-3	10,0M	112,6sec	167ms	1 sec, 437ms	520ms	228ms	1sec, 256ms
		4 levels	2-4	10,0M	111,2sec	190ms	2sec, 472ms	554ms	304ms	4sec, 481ms
		5 levels	2-5	10,0M	113,7sec	207ms	3sec, 42ms	1sec, 208ms	369ms	7sec, 82ms
10M	One-level model			30,0M	412,3sec	323ms	2sec, 220ms	43sec, 472ms	43sec, 31ms	40sec, 235ms
		3 levels	3-3	20,0M	227,2sec	230ms	2sec, 175ms	2sec, 178ms	295ms	3sec, 457ms

	Hierarchical model		2-3	20,0M	218,2sec	233ms	2sec, 56ms	2sec, 823ms	278ms	3sec, 981ms
		4 levels	2-4	20,0M	213,8sec	237ms	3sec, 49ms	3sec, 527ms	381ms	4sec, 961ms
		5 levels	2-5	20,0M	232sec	245ms	3sec, 217ms	5sec, 537ms	589ms	6sec, 481ms
15M	One-level model			45,0M	852,8sec	270ms	5sec, 924ms	1min, 34sec, 989ms	1min, 19sec, 683ms	1min, 18sec, 242ms
	Hierarchical model	3 levels	3-3	30,0M	361,9sec	169ms	4sec, 478ms	3sec, 602ms	254ms	5sec, 897ms
			2-3	30,0M	334,8sec	177ms	6sec, 368ms	9sec, 217ms	346ms	16sec, 583ms
		4 levels	2-4	30,0M	339,6sec	291ms	9sec, 346ms	11sec, 633ms	375ms	17sec, 702ms
		5 levels	2-5	30,0M	356,9sec	368ms	9sec, 450ms	12sec, 727ms	438ms	16sec, 735ms

The parameters of the experiment

The two models are linked:

Model #1		**Model #2**	
Level 1	1 node	Level 1	1 node
Level 2	1000 nodes	Level 2	1000 nodes
Level 3	1000 nodes	Level 3	1000 nodes
Level 4	1000 nodes	Level 4	1000 nodes
Level 5	1000 nodes	Level 5	1000 nodes
Objects number	100к – 15M	Options nuber	1000

The graph structure from Level 1 to Level 5 is tree. The objects and options are linked to levels 3-5 according the experiment conditions.

Every SPARQL request is executed 3 times and average time value is taken as result.

Requests

One-level model

Request #1	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Object my:has_id "Object_10000"
	}

Request #2	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Object my:has_option_id "Option_10" .
	}

Request #3	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Object my:has_option_id ?Option_id .
	FILTER (?Option_id = "Option_9" || ?Option_id = "Option_10")
	}

Request #4	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#> SELECT (count(distinct ?Object) as ?count) WHERE

	{
	?Object my:has_option_id ?Option_id .
	FILTER (?Option_id = "Option_9" || ?Option_id = "Option_10")
	}
	GROUP BY ?Option_id

Request #5	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Object my:has_option_id ?Option_id .
	FILTER contains(?Option_id, "_200")
	}

3-level model, the source connected levels: 3-3

Request #1	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Object my:has_id "Object_10000"
	}

Request #2	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#> SELECT ?Object WHERE { ?Option my:has_id "Option_10" . ?Option my:has_parent_id ?Core_2_Level_3 . ?Core_1_Level_3 my:linked_to ?Core_2_Level_3 .

	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id . ?Object my:has_parent_id ?Core_1_Level_3_id . } LIMIT 10000000

Request #3	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Option my:has_id ?Option_id .
	?Option my:has_parent_id ?Core_2_Level_3 .
	?Core_1_Level_3 my:linked_to ?Core_2_Level_3 .
	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id .
	?Object my:has_parent_id ?Core_1_Level_3_id .
	FILTER (?Option_id = "Option_9" || ?Option_id = "Option_10")
	}
	LIMIT 10000000

Request #4	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT (count(distinct ?Object) as ?count)
	WHERE
	{
	?Option my:has_id ?Option_id .
	?Option my:has_parent_id ?Core_2_Level_3 .
	?Core_1_Level_3 my:linked_to ?Core_2_Level_3 .
	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id .
	?Object my:has_parent_id ?Core_1_Level_3_id .
	FILTER (?Option_id = "Option_9" || ?Option_id = "Option_10")
	}
	GROUP BY ?Option_id

Request #5	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#>

	SELECT ?Object
	WHERE
	{
	?Option my:has_id ?Option_id .
	?Option my:has_parent_id ?Core_2_Level_3 .
	?Core_1_Level_3 my:linked_to ?Core_2_Level_3 .
	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id .
	?Object my:has_parent_id ?Core_1_Level_3_id .
	FILTER contains(?Option_id, "_200")
	}
	LIMIT 10000000

3-level model, the source connected levels: 2-3

Request #1	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Object my:has_id "Object_10000"
	}

Request #2	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#> SELECT ?Object WHERE { ?Option my:has_id "Option_11" . ?Option my:has_parent_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id . ?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id . ?Core_1_Level_2 my:has_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id .

	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id . ?Object my:has_parent_id ?Core_1_Level_3_id . } LIMIT 10000000

Request #3	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Option my:has_id ?Option_id .
	?Option my:has_parent_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id .
	?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id .
	?Core_1_Level_2 my:has_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id .
	?Object my:has_parent_id ?Core_1_Level_3_id .
	FILTER (?Option_id = "Option_8" || ?Option_id = "Option_11")
	}
	LIMIT 10000000

Request #4	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#> SELECT (count(distinct ?Object) as ?count) WHERE { ?Option my:has_id ?Option_id . ?Option my:has_parent_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id . ?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id . ?Core_1_Level_2 my:has_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_id ?Core_1_Level_3_id .

	?Object my:has_parent_id ?Core_1_Level_3_id . FILTER (?Option_id = "Option_8" || ?Option_id = "Option_11") } GROUP BY ?Option_id

Request #5	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Option my:has_id ?Option_id .
	?Option my:has_parent_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id .
	?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id .
	?Core_1_Level_2 my:has_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id .
	?Object my:has_parent_id ?Core_1_Level_3_id .
	FILTER contains(?Option_id, "_20")
	}
	LIMIT 10000000

4-level model, the source connected levels: 2-4

Request #1	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Object my:has_id "Object_10000"
	}

Request #2	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Option my:has_id "Option_913" .
	?Option my:has_parent_id ?Core_2_Level_4_id .
	?Core_2_Level_4 my:has_id ?Core_2_Level_4_id .
	?Core_2_Level_4 my:has_parent_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id .
	?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id .
	?Core_1_Level_2 my:has_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id .
	?Core_1_Level_4 my:has_parent_id ?Core_1_Level_3_id .
	?Core_1_Level_4 my:has_id ?Core_1_Level_4_id .
	?Object my:has_parent_id ?Core_1_Level_4_id .
	}
	LIMIT 10000000

Request #3	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#> SELECT ?Object WHERE { ?Option my:has_id ?Option_id . ?Option my:has_parent_id ?Core_2_Level_4_id . ?Core_2_Level_4 my:has_id ?Core_2_Level_4_id . ?Core_2_Level_4 my:has_parent_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id . ?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id . ?Core_1_Level_2 my:has_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_id ?Core_1_Level_3_id . ?Core_1_Level_4 my:has_parent_id ?Core_1_Level_3_id .

	?Core_1_Level_4 my:has_id ?Core_1_Level_4_id . ?Object my:has_parent_id ?Core_1_Level_4_id . FILTER (?Option_id = "Option_913" || ?Option_id = "Option_10") } LIMIT 10000000

Request #4	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT (count(distinct ?Object) as ?count)
	WHERE
	{
	?Option my:has_id ?Option_id .
	?Option my:has_parent_id ?Core_2_Level_4_id .
	?Core_2_Level_4 my:has_id ?Core_2_Level_4_id .
	?Core_2_Level_4 my:has_parent_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id .
	?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id .
	?Core_1_Level_2 my:has_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id .
	?Core_1_Level_4 my:has_parent_id ?Core_1_Level_3_id .
	?Core_1_Level_4 my:has_id ?Core_1_Level_4_id .
	?Object my:has_parent_id ?Core_1_Level_4_id .
	FILTER (?Option_id = "Option_913" || ?Option_id = "Option_10")
	}
	GROUP BY ?Option_id

Request #5	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#> SELECT ?Object WHERE { ?Option my:has_id ?Option_id . ?Option my:has_parent_id ?Core_2_Level_4_id . ?Core_2_Level_4 my:has_id ?Core_2_Level_4_id .

	?Core_2_Level_4 my:has_parent_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id . ?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id . ?Core_1_Level_2 my:has_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_id ?Core_1_Level_3_id . ?Core_1_Level_4 my:has_parent_id ?Core_1_Level_3_id . ?Core_1_Level_4 my:has_id ?Core_1_Level_4_id . ?Object my:has_parent_id ?Core_1_Level_4_id . FILTER contains(?Option_id, "_20") } LIMIT 10000000

5-level model, the source connected levels: 2-5

Request #1	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT ?Object
	WHERE
	{
	?Object my:has_id "Object_10000"
	}

Request #2	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#> SELECT ?Object WHERE { ?Option my:has_id "Option_913" . ?Option my:has_parent_id ?Core_2_Level_5_id . ?Core_2_Level_5 my:has_id ?Core_2_Level_5_id . ?Core_2_Level_5 my:has_parent_id ?Core_2_Level_4_id . ?Core_2_Level_4 my:has_id ?Core_2_Level_4_id .

	?Core_2_Level_4 my:has_parent_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id . ?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id . ?Core_1_Level_2 my:has_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_id ?Core_1_Level_3_id . ?Core_1_Level_4 my:has_parent_id ?Core_1_Level_3_id . ?Core_1_Level_4 my:has_id ?Core_1_Level_4_id . ?Core_1_Level_5 my:has_parent_id ?Core_1_Level_4_id . ?Core_1_Level_5 my:has_id ?Core_1_Level_5_id . ?Object my:has_parent_id ?Core_1_Level_5_id . } LIMIT 10000000
Request #3	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#> SELECT ?Object WHERE { ?Option my:has_id ?Option_id . ?Option my:has_parent_id ?Core_2_Level_5_id . ?Core_2_Level_5 my:has_id ?Core_2_Level_5_id . ?Core_2_Level_5 my:has_parent_id ?Core_2_Level_4_id . ?Core_2_Level_4 my:has_id ?Core_2_Level_4_id . ?Core_2_Level_4 my:has_parent_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id . ?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id . ?Core_1_Level_2 my:has_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_id ?Core_1_Level_3_id . ?Core_1_Level_4 my:has_parent_id ?Core_1_Level_3_id . ?Core_1_Level_4 my:has_id ?Core_1_Level_4_id . ?Core_1_Level_5 my:has_parent_id ?Core_1_Level_4_id . ?Core_1_Level_5 my:has_id ?Core_1_Level_5_id . ?Object my:has_parent_id ?Core_1_Level_5_id .

	FILTER (?Option_id = "Option_913" || ?Option_id = "Option_10") } LIMIT 10000000

Request #4	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
	PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
	PREFIX xsd: <http://www.w3.org/2001/XMLSchema>
	PREFIX my: <http://127.0.0.1/bg/ont/test1#>
	SELECT (count(distinct ?Object) as ?count)
	WHERE
	{
	?Option my:has_id ?Option_id .
	?Option my:has_parent_id ?Core_2_Level_5_id .
	?Core_2_Level_5 my:has_id ?Core_2_Level_5_id .
	?Core_2_Level_5 my:has_parent_id ?Core_2_Level_4_id .
	?Core_2_Level_4 my:has_id ?Core_2_Level_4_id .
	?Core_2_Level_4 my:has_parent_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_id ?Core_2_Level_3_id .
	?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id .
	?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id .
	?Core_1_Level_2 my:has_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id .
	?Core_1_Level_3 my:has_id ?Core_1_Level_3_id .
	?Core_1_Level_4 my:has_parent_id ?Core_1_Level_3_id .
	?Core_1_Level_4 my:has_id ?Core_1_Level_4_id .
	?Core_1_Level_5 my:has_parent_id ?Core_1_Level_4_id .
	?Core_1_Level_5 my:has_id ?Core_1_Level_5_id .
	?Object my:has_parent_id ?Core_1_Level_5_id .
	FILTER (?Option_id = "Option_913" || ?Option_id = "Option_10")
	}
	GROUP BY ?Option_id

Request #5	PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> PREFIX xsd: <http://www.w3.org/2001/XMLSchema> PREFIX my: <http://127.0.0.1/bg/ont/test1#> SELECT ?Object WHERE { ?Option my:has_id ?Option_id .

	?Option my:has_parent_id ?Core_2_Level_5_id . ?Core_2_Level_5 my:has_id ?Core_2_Level_5_id . ?Core_2_Level_5 my:has_parent_id ?Core_2_Level_4_id . ?Core_2_Level_4 my:has_id ?Core_2_Level_4_id . ?Core_2_Level_4 my:has_parent_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_id ?Core_2_Level_3_id . ?Core_2_Level_3 my:has_parent_id ?Core_2_Level_2_id . ?Core_1_Level_2 my:linked_to ?Core_2_Level_2_id . ?Core_1_Level_2 my:has_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_parent_id ?Core_1_Level_2_id . ?Core_1_Level_3 my:has_id ?Core_1_Level_3_id . ?Core_1_Level_4 my:has_parent_id ?Core_1_Level_3_id . ?Core_1_Level_4 my:has_id ?Core_1_Level_4_id . ?Core_1_Level_5 my:has_parent_id ?Core_1_Level_4_id . ?Core_1_Level_5 my:has_id ?Core_1_Level_5_id . ?Object my:has_parent_id ?Core_1_Level_5_id . FILTER contains(?Option_id, "_20") } LIMIT 10000000