

Group 1:

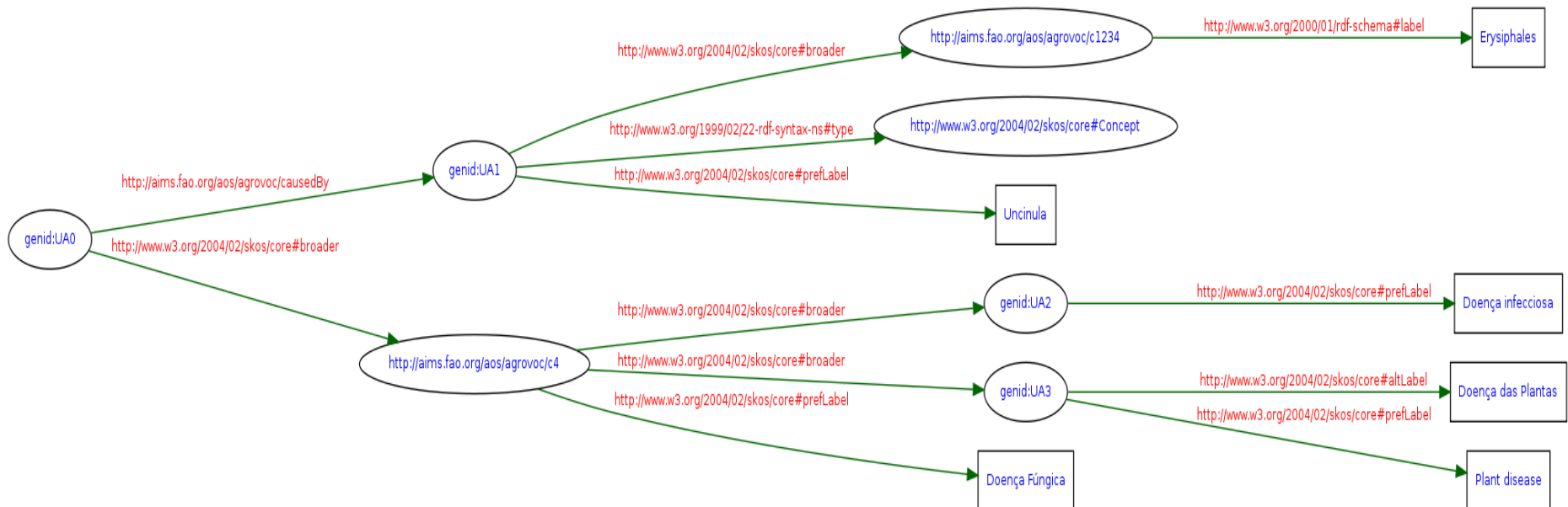
Triples obtained by Jena's rdfcat utility:

```
<http://aims.fao.org/aos/agrovoc/c_4825> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2004/02/skos/core#Concept> .
<http://aims.fao.org/aos/agrovoc/c_4825> <http://www.w3.org/2004/02/skos/core#prefLabel> "Mildio"@pt .
<http://aims.fao.org/aos/agrovoc/c_4825> <http://www.w3.org/2004/02/skos/core#prefLabel> "Mildews"@en .
<http://aims.fao.org/aos/agrovoc/c_4825> <http://www.w3.org/2004/02/skos/core#narrower> <http://aims.fao.org/aos/agrovoc/c_13557> .
<http://aims.fao.org/aos/agrovoc/c_4825> <http://aims.fao.org/aos/agrontology#hasStatus> "Published"^^<http://www.w3.org/2001/XMLSchema#string> .
<http://aims.fao.org/aos/agrovoc/c_4825> <http://www.w3.org/2004/02/skos/core#exactMatch> <http://lod.nal.usda.gov/nalt/34451> .
<http://aims.fao.org/aos/agrovoc/c_4825> <http://www.w3.org/2004/02/skos/core#inScheme> <http://aims.fao.org/aos/agrovoc> .
_:Ffe <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://purl.org/net/provenance/ns#DataCreation> .
_:Ffe <http://purl.org/net/provenance/ns#performedAt> "2013-04-01T10:34:58.967Z"^^<http://www.w3.org/2001/XMLSchema#dateTime> .
<http://aims.fao.org/aos/data/c_4825?output=xml> <http://www.w3.org/2000/01/rdf-schema#label> "RDF description of c_4825" .
<http://aims.fao.org/aos/data/c_4825?output=xml> <http://xmlns.com/foaf/0.1/primaryTopic> <http://aims.fao.org/aos/agrovoc/c_4825> .
_:Fff <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2004/03/trix/rdfg-1/Graph> .
_:Fff <http://purl.org/net/provenance/ns#createdBy> _:Ffe .
_:Fff <http://xmlns.com/foaf/0.1/topic> _:Fff .
_:Fff <http://xmlns.com/foaf/0.1/primaryTopic> <http://aims.fao.org/aos/agrovoc/c_4825> .
```

Group 2:

Triples of the given document:

1. `_:UA0 <http://aims.fao.org/aos/agrovoc/causedBy> _:UA1 .`
2. `_:UA0 <http://www.w3.org/2004/02/skos/core#broader> <http://aims.fao.org/aos/agrovoc/c4> .`
3. `<http://aims.fao.org/aos/agrovoc/c4> <http://www.w3.org/2004/02/skos/core#prefLabel> "Doença Fúngica"@pt .`
4. `<http://aims.fao.org/aos/agrovoc/c4> <http://www.w3.org/2004/02/skos/core#broader> _:UA2 .`
5. `<http://aims.fao.org/aos/agrovoc/c4> <http://www.w3.org/2004/02/skos/core#broader> _:UA3 .`
6. `_:UA1 <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2004/02/skos/core#Concept> .`
7. `_:UA1 <http://www.w3.org/2004/02/skos/core#prefLabel> "Uncinula" .`
8. `_:UA1 <http://www.w3.org/2004/02/skos/core#broader> <http://aims.fao.org/aos/agrovoc/c1234> .`
9. `_:UA2 <http://www.w3.org/2004/02/skos/core#prefLabel> "Doença infecciosa"@pt .`
10. `_:UA3 <http://www.w3.org/2004/02/skos/core#altLabel> "Doença das Plantas"@pt .`
11. `_:UA3 <http://www.w3.org/2004/02/skos/core#prefLabel> "Plant disease"@en .`
12. `<http://aims.fao.org/aos/agrovoc/c1234> <http://www.w3.org/2000/01/rdf-schema#label> "Erysiphales" .`



2a)

- 1) NOT entailed (explain why using interpolation lemma). Because the only node with an outgoing arc with predicate `rdf:type` is `_:UA1` (for instantiating `_:y`) but this node has no incidente arc with `skos:broader` property.
- 2) ENTAILED (explain why using interpolation lemma). Instance by mapping `_:x` into `<http://aims.fao.org/aos/agrovoc/c4>`, `_:y` into `_:UA3` and `_:z` and `_:w` into “Plant Disease”@en,
- 3) ENTAILED (explain why using interpolation lemma). Instance by mapping `_:w` into `_:UA0`, `_:x` and `_:z` into `<http://aims.fao.org/aos/agrovoc/c4>`, and `_:y` into `_:UA2` or `_:UA3`.
- 4) NOT ENTAILED (explain why using interpolation lemma). There is no node in graph `O` with two indident arcs labeled with `skos:prefLabel`, because `_:x` and `_:y` cannot be identical due to the fact there is no node of the form `_:w skos:broader _:w`

2b) Consider the additional triples stated in the text:

13. `_:b rdf:type <http://aims.fao.org/aos/agrovoc/c4> .`
14. `skos:prefLabel rdfs:subPropertyOf rdfs:label .`
15. `skos:altLabel rdfs:subPropertyOf rdfs:label .`
16. `skos:broader rdfs:subPropertyOf rdfs:subClassOf .`
17. `skos:broader rdfs:domain skos:Concept .`
18. `skos:broader rdfs:range skos:Concept .`

We have to obtain the following triples:

```
_:x rdf:type _:y .
_:y rdf:type skos:Concept .
_:y rdfs:label _:z .
_:y skos:altLabel _:z .
```

Let's apply the RDFS reasoning algorithm. First, note that there is not the use of container membership properties in the graph and in the query, so we will not apply steps 2 and 3 of the closure algorithm. Moreover, we will not require the use of RDF and RDFS axiomatic triples. So, we will apply step 4 till we get the intended triples.

Clearly, `_:y` must be `_:UA3` and `_:z` must be “Doença das plantas”@pt . This remark is enough to focus the proof in the interesting part.

The proof is as follows:

19.	_:UA3 rdfs:label "Doença das Plantas"@pt .	by rdfs7 applied to 10 and 15
20.	_:UA3 rdf:type skos:Concept	by rdfs3 applied to 5 and 18
21.	<http://aims.fao.org/aos/agrovoc/c4> rdfs:subClassOf _:UA3 .	by rdfs7 applied to 5 and 16
22.	_:b rdf:type _:UA3	by rdfs9 applied to 13 and 21

Now by the interpolation lemma it follows that graph 0 is RDFS-entailed, since 0 is simple entailed by the closure with the instance:

- _:x mapped into _:b
- _:y mapped into _:UA3
- _:z mapped into _:z

You can also continue by applying the simple-entailment rules requiring 7 extra steps:

23.	_:y skos:altLabel "Doença das Plantas"@pt .	by se2 applied to 10 and allocating _:UA3 to _:y
24.	_:y skos:altLabel _:z .	by se1 applied to 23 and allocating "Doença das Plantas"@pt to _:z
25.	_:y rdfs:label "Doença das Plantas"@pt .	by se2 applied to 19 and using the previous allocation
26.	_:y rdfs:label _:z .	by se1 applied to 25 and using the previous allocation
27.	_:y rdf:type skos:Concept .	by se2 applied to 20 and using the previous allocation
28.	_:b rdf:type _:y	by se1 applied to 22 and using the previous allocation
29.	_:x rdf:type _:y	by se2 applied to 28 and allocating _:b to _:x

All the triples of 0 have been obtained.

2c) Assume that the prefixes have been declared:

```
SELECT ?res ?label
WHERE {
    {
        { ?res a rdfs:Resource }
        MINUS
        { ?res skos:broader ?x }
    }
    OPTIONAL
    {
        { ?res skos:prefLabel ?label }
        UNION
        { ?res skos:altLabel ?label }
    }
}
```

2d)

The OPTIONAL pattern is evaluated as follows:

?x	?y	⋈	?y	?z	=	?x	?y	?z
_:UA0	<c4>		<c4>	"Doença Fúngica"@pt		_:UA0	<c4>	"Doença Fúngica"@pt
<c4>	_:UA2		_:UA1	"Uncinula"		<c4>	_:UA2	"Doença infecciosa"@pt
<c4>	_:UA3		_:UA2	"Doença infecciosa"@pt		<c4>	_:UA3	"Plant disease"@en
_:UA1	<c1234>		_:UA3	"Plant disease"@en				

The basic graph pattern with the FILTER expression results in:

?y	?w	-> FILTER	?y	?w
<c4>	"Doença Fúngica"@pt		_:UA3	"Plant disease"@en
_:UA1	"Uncinula"			
_:UA2	"Doença infecciosa"@pt			
_:UA3	"Plant disease"@en			

The MINUS is evaluated as follows:

?x	?y	?z	-	?y	?w	=	?x	?y	?z
_:UA0	<c4>	"Doença Fúngica"@pt		_:UA3	"Plant disease"@en		_:UA0	<c4>	"Doença Fúngica"@pt
<c4>	_:UA2	"Doença infecciosa"@pt					<c4>	_:UA2	"Doença infecciosa"@pt
<c4>	_:UA3	"Plant disease"@en							

Finally projection in columns ?x and ?z one gets the answer:

?x	?z
_:UA0	"Doença Fúngica"@pt
<c4>	"Doença infecciosa"@pt