

Rapport de mini projet soumis à l'
UNIVERSITÉ MOHAMED BOUDIAF – MSILA



FACULTÉ DES MATHÉMATIQUES ET DE L'INFORMATIQUE
DÉPARTEMENT DE L'INFORMATIQUE

Module : *Ontologies et Web Sémantique (OWS)*

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Titre du projet

Mini Projet : Ontologie Famille

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1) Définition de l'ontologie :

```
<?xml version="1.0"?>
<rdf:RDF xmlns="http://www.univ-msila.dz/11/OwsOntologie"
  xml:base="http://www.univ-msila.dz/11/OwsOntologie"
  xmlns:o="http://www.univ-msila.dz/11/o#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:swrl="http://www.w3.org/2003/11/swrl#"
  xmlns:OwsOntologie="http://www.univ-msila.dz/11/OwsOntologie#">
  <owl:Ontology rdf:about="http://www.univ-msila.dz/11/o"/>
```

a. Les classes d'ontologie :

i. Personne :

```
<owl:Class rdf:about="#personne"/>
```

ii. Enfant :

```
<owl:Class rdf:about="#enfant">
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#enfantDe"/>
      <owl:minCardinality rdf:datatype="&xsd:nonNegativeInteger"
        1
      </owl:minCardinality>
    </owl:Restriction>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#personne"/>
</owl:Class>
```

iii. Parent :

```
<owl:Class rdf:about="#parent">
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#parentDe"/>
      <owl:someValuesFrom rdf:resource="#Thing"/>
    </owl:Restriction>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#personne"/>
</owl:Class>
```

iv. Homme :

```
<owl:Class rdf:about="#homme">
  <rdfs:subClassOf rdf:resource="#personne"/>
</owl:Class>
```

v. GrandParent :

```
<owl:Class rdf:about="#grandparent">
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#parentDe"/>
      <owl:someValuesFrom rdf:resource="#parent"/>
    </owl:Restriction>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#personne"/>
</owl:Class>
```

vi. Femme :

```
<owl:Class rdf:about="#femme">
  <rdfs:subClassOf rdf:resource="#personne"/>
  <owl:disjointWith rdf:resource="#homme"/>
</owl:Class>
```

vii. Fratrie :

```
<owl:Class rdf:about="#fraterie">
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#frereSoeurDe"/>
      <owl:someValuesFrom rdf:resource="#Thing"/>
    </owl:Restriction>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#personne"/>
</owl:Class>
```

viii. Jeune :

```
<owl:Class rdf:about="#jeune">
  <rdfs:subClassOf rdf:resource="#personne"/>
</owl:Class>
```

SWRL (Jeun):

`o:personneAge(?x, ?y) ^ swrlb:lessThanOrEqual(?y, 20) -> o:jeune(?x)`

ix. Fils :

```
<owl:Class rdf:about="#fils">
  <owl:equivalentClass>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdf:Description rdf:about="#homme"/>
        <owl:Restriction>
          <owl:onProperty rdf:resource="#enfantDe"/>
          <owl:minCardinality rdf:datatype="&xsd:nonNegativeInteger">
            1
          </owl:minCardinality>
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#enfant"/>
</owl:Class>
```

x. Fille :

```
<owl:Class rdf:about=" #fille">
  <owl:equivalentClass>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdf:Description rdf:about="#femme"/>
        <owl:Restriction>
          <owl:onProperty rdf:resource="#enfantDe"/>
          <owl:minCardinality rdf:datatype="&xsd:nonNegativeInteger">
            1
          </owl:minCardinality>
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#enfant"/>
</owl:Class>
```

xi. Père :

```
<owl:Class rdf:about="#pere">
  <rdfs:subClassOf rdf:resource="#homme"/>
  <rdfs:subClassOf rdf:resource="#parent"/>
</owl:Class>
```

xii. Oncle :

```
<owl:Class rdf:about="#oncle">
  <owl:equivalentClass>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdf:Description rdf:about="#homme"/>
        <owl:Restriction>
          <owl:onProperty rdf:resource="#frereSoeurDe"/>
          <owl:someValuesFrom rdf:resource="#parent"/>
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </owl:equivalentClass>
</owl:Class>
```

xiii. Mère :

```
<owl:Class rdf:about="#mere">
  <rdfs:subClassOf rdf:resource="#femme"/>
  <rdfs:subClassOf rdf:resource="#parent"/>
</owl:Class>
```

xiv. Grandpere :

```
<owl:Class rdf:about="#grandpere">
  <owl:equivalentClass>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdf:Description rdf:about="#pere"/>
        <owl:Restriction>
          <owl:onProperty rdf:resource="#parentDe"/>
          <owl:someValuesFrom rdf:resource="#parent"/>
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#homme"/>
  <rdfs:subClassOf rdf:resource="#grandparent"/>
</owl:Class>
```

xv. Frere :

```
<owl:Class rdf:about="#frere">
  <owl:equivalentClass>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdf:Description rdf:about="#homme"/>
        <owl:Restriction>
          <owl:onProperty rdf:resource="#frereSoeurDe"/>
          <owl:someValuesFrom rdf:resource="#Thing"/>
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#fraterie"/>
  <rdfs:subClassOf rdf:resource="#homme"/>
</owl:Class>
```

xvi. Grandmere :

```
<owl:Class rdf:about="#grandmere">
  <owl:equivalentClass>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdf:Description rdf:about="#mere"/>
        <owl:Restriction>
          <owl:onProperty rdf:resource="#parentDe"/>
          <owl:someValuesFrom rdf:resource="#parent"/>
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#femme"/>
  <rdfs:subClassOf rdf:resource="#grandparent"/>
</owl:Class>
```

xvii. Sœur :

```
<owl:Class rdf:about="#soeur">
  <owl:equivalentClass>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdf:Description rdf:about="#femme"/>
        <owl:Restriction>
          <owl:onProperty rdf:resource="#frereSoeurDe"/>
          <owl:someValuesFrom rdf:resource="#Thing"/>
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#femme"/>
  <rdfs:subClassOf rdf:resource="#grandparent"/>
</owl:Class>
```

```

        </owl:intersectionOf>
    </owl:Class>
</owl:equivalentClass>
<rdfs:subClassOf rdf:resource="#fraterie"/>
<rdfs:subClassOf rdf:resource="#fomme"/>
</owl:Class>

```

b. Les relations:

i. enfantDe:

```

<owl:ObjectProperty rdf:about="#enfantDe">
  <rdf:type rdf:resource="#&owl;AsymmetricProperty"/>
  <rdfs:domain rdf:resource="#enfant"/>
  <rdfs:range rdf:resource="#parent"/>
</owl:ObjectProperty>

```

ii. ParentDe:

```

<owl:ObjectProperty rdf:about="#parentDe">
  <rdf:type rdf:resource="#&owl;AsymmetricProperty"/>
  <rdfs:domain rdf:resource="#parent"/>
  <rdfs:range rdf:resource="#enfant"/>
</owl:ObjectProperty>

```

iii. FrereSoeurDe:

```

<owl:ObjectProperty rdf:about="#frereSoeurDe">
  <rdf:type rdf:resource="#&owl;TransitiveProperty"/>
  <rdfs:domain rdf:resource="#personne"/>
  <rdfs:range rdf:resource="#fraterie"/>
</owl:ObjectProperty>

```

SWRL RULE:

```

o:enfantDe(?x, ?y) ^ o:enfantDe(?z, ?y) ^ differentFrom(?x, ?z) ->
o:frereSoeurDe(?x, ?z)

```

iv. cousinDe:

```

<owl:ObjectProperty rdf:about="#cousinDe">
  <rdf:type rdf:resource="#&owl;SymmetricProperty"/>
  <rdf:type rdf:resource="#&owl;IrreflexiveProperty"/>
  <rdfs:domain rdf:resource="#personne"/>
  <rdfs:range rdf:resource="#personne"/>

```

```
</owl:ObjectProperty>
```

v. **estMarieAvec:**

```
<owl:ObjectProperty rdf:about="#estMarieAvec">  
  <rdf:type rdf:resource="#owl:SymmetricProperty"/>  
  <rdfs:domain rdf:resource="#personne"/>  
  <rdfs:range rdf:resource="#personne"/>  
</owl:ObjectProperty>
```

2) **Enrichir l'ontologie :**

a. **Nouvelles classes:**

i. **Métier :**

```
<owl:Class rdf:about="#metier"/>
```

ii. **Enseignant :**

```
<owl:Class rdf:about="#enseignant">  
  <rdfs:subClassOf rdf:resource="#metier"/>  
</owl:Class>
```

iii. **Etudiant :**

```
<owl:Class rdf:about="#etudiant">  
  <rdfs:subClassOf rdf:resource="#metier"/>  
</owl:Class>
```

iv. **Chauffeur :**

```
<owl:Class rdf:about="#chauffeur">  
  <rdfs:subClassOf rdf:resource="#metier"/>  
</owl:Class>
```

v. **Médecin :**

```
<owl:Class rdf:about="#medecin">  
  <rdfs:subClassOf rdf:resource="#metier"/>  
</owl:Class>
```


b. Les restrictions:

Note : protégé est un structure on **monde ouvert** alors pour utilise le operateur **<only>** on ajout autre condition pour passe au monde fermé

i. Célibataire:

```
<owl:Class rdf:about="#celibataire">
  <owl:equivalentClass>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdf:Description rdf:about="#personne"/>
        <owl:Class>
          <owl:complementOf rdf:resource="#epoux"/>
        </owl:Class>
      </owl:intersectionOf>
    </owl:Class>
  </owl:equivalentClass>
</owl:Class>
```

ii. Epoux:

```
<owl:Class rdf:about="#epoux">
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#estMarieAvec"/>
      <owl:someValuesFrom rdf:resource="#personne"/>
    </owl:Restriction>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#personne"/>
</owl:Class>
```

iii. Pere type:

```
<owl:Class rdf:about="#pereType">
  <owl:equivalentClass>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdf:Description rdf:about="#pere"/>
        <owl:Restriction>
```

```

        <owl:onProperty rdf:resource="#parentDe"/>
        <owl:minCardinality
rdf:datatype="#nonNegativeInteger">1</owl:minCardinality>
        <owl:onClass rdf:resource="#fils"/>
    </owl:Restriction>
</owl:intersectionOf>
</owl:Class>
</owl:equivalentClass>
<rdfs:subClassOf rdf:resource="#pere"/>
</owl:Class>

```

iv. **Mere de filles:**

```

<owl:Class rdf:about="#mereDeFilles">
    <owl:equivalentClass>
        <owl:Restriction>
            <owl:intersectionOf rdf:parseType="Collection">
                <owl:class rdf:about="#mere"/>
                <owl:onProperty rdf:resource="#parentDe"/>
                <owl:AllValuesFrom rdf:resource="#fille"/>
            </owl:Restriction>
        </owl:intersectionOf>
    </owl:equivalentClass>
    <rdfs:subClassOf rdf:resource="#mere"/>
</owl:Class>

```

v. **Pere de famille Nombreuse:(au min 3 enfants)**

```

<owl:Class rdf:about="#pereDeFamilleNombreuse">
    <owl:equivalentClass>
        <owl:Restriction>
            <owl:onProperty rdf:resource="#parentDe"/>
            <owl:minCardinality rdf:datatype="#xsd:nonNegativeInteger">
                3
            </owl:minCardinality>
        </owl:Restriction>
    </owl:equivalentClass>
    <rdfs:subClassOf rdf:resource="#pere"/>
</owl:Class>

```

vi. **Parent normal: (un enfant medcin)**

```

<owl:Class rdf:about="#parentNormal">

```

```

    <owl:equivalentClass>
      <owl:Restriction>
        <owl:onProperty rdf:resource="#parentDe"/>
        <owl:someValuesFrom rdf:resource="#medcin"/>
      </owl:Restriction>
    </owl:equivalentClass>
    <rdfs:subClassOf rdf:resource="#parent"/>
  </owl:Class>

```

vii. Parent heureux: (tous enfants medcines)

```

<owl:Class rdf:about="#parentheureux">
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#parentDe"/>
      <owl:AllValuesFrom rdf:resource="#medcin"/>
    </owl:Restriction>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#parent"/>
</owl:Class>

```

viii. Parent type: (au min 1 fils)

```

<owl:Class rdf:about="#parentType">
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#parentDe"/>
      <owl:someValuesFrom rdf:resource="#etudiant"/>
    </owl:Restriction>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#parent"/>
</owl:Class>

```

ix. Parent choyé: (tous ces enfants de parents)

```

<owl:Class rdf:about="#parentchoye">
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#parentDe"/>
      <owl:AllValuesFrom rdf:resource="#parent"/>
    </owl:Restriction>
  </owl:equivalentClass>
  <rdfs:subClassOf rdf:resource="#parent"/>
</owl:Class>

```

3) Crées des individus :

a. Rokaya:

```
<owl:NamedIndividual rdf:about="#rokaya">
  <rdf:type rdf:resource="#femme"/>
  <o:nom>rokaya</o:nom>
  <o:personneAge
```

Les restriction pour spesefie les
cardinalty est passe au monde ferme
(eveter les cas de ne vrai ne faux)

```
  <rdf:type="&xsd:integer">75</o:personneAge>
  <rdf:type>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#paerntde"/>
      <owl:cardinality rdf:datatype="#int">2</owl:cardinality>
    </owl:Restriction>
  </rdf:type>

</owl:NamedIndividual>
```

b. Ahmed:

```
<owl:NamedIndividual rdf:about="#ahmed">
  <rdf:type rdf:resource="#homme"/>
  <o:estMarieAvec rdf:resource="#rokaya"/>
  <o:nom>ahmed</o:nom>
  <o:personneAge rdf:datatype="&xsd:integer">80</o:personneAge>

  <rdf:type>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#parentde"/>
      <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
    </owl:Restriction>
  </rdf:type>

</owl:NamedIndividual>
```

c. Karim:

```
<owl:NamedIndividual rdf:about="#karim">
  <rdf:type rdf:resource="#homme"/>
  <o:enfantDe rdf:resource="#ahmed"/>
  <o:enfantDe rdf:resource="#rokaya"/>
  <o:nom>karim</o:nom>
  <o:personneAge rdf:datatype="&xsd:integer">40</o:personneAge>
  <rdf:type>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#parentde"/>
```

```

        <owl:cardinality rdf:datatype="#int">2</owl:cardinality>
    </owl:Restriction>
</rdf:type>

</owl:NamedIndividual>

```

d. **Amel:**

```

<owl:NamedIndividual rdf:about="#amel">
    <rdf:type rdf:resource="#etudiant"/>
    <rdf:type rdf:resource="#femme"/>
    <o:enfantDe rdf:resource="#ahmed"/>
    <o:nom>amel</o:nom>
    <o:personneAge rdf:datatype="&xsd:integer">17</o:personneAge>
<rdf:type>
    <owl:Restriction>
        <owl:onProperty rdf:resource="#estMarieAvec"/>
        <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
    </owl:Restriction>
</rdf:type>

</owl:NamedIndividual>

```

e. **Samir:**

```

<owl:NamedIndividual rdf:about="#samir">
    <rdf:type rdf:resource="#homme"/>
    <o:enfantDe rdf:resource="#ahmed"/>
    <o:enfantDe rdf:resource="#rokaya"/>
    <o:nom>samir</o:nom>
    <o:personneAge rdf:datatype="&xsd:integer">50</o:personneAge>
<rdf:type>
    <owl:Restriction>
        <owl:onProperty rdf:resource="#parentde"/>
        <owl:cardinality rdf:datatype="#int">1</owl:cardinality>
    </owl:Restriction>
</rdf:type>

</owl:NamedIndividual>

```

f. **Hala:**

```

<owl:NamedIndividual rdf:about="#hala">
    <rdf:type rdf:resource="#femme"/>
    <o:estMarieAvec rdf:resource="#samir"/>
    <o:nom>hala</o:nom>
    <o:personneAge rdf:datatype="&xsd:integer">45</o:personneAge>
<rdf:type>
    <owl:Restriction>
        <owl:onProperty rdf:resource="#parentde"/>

```

```

        <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
      </owl:Restriction>
    </rdf:type>

  </owl:NamedIndividual>

```

g. Dounia:

```

<owl:NamedIndividual rdf:about="#dounia">
  <rdf:type rdf:resource="#femme"/>
  <o:estMarieAvec rdf:resource="#karim"/>
  <o:nom>dounia</o:nom>
  <o:personneAge rdf:datatype="#xsd:integer">35</o:personneAge>
  <rdf:type>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#parentde"/>
      <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
    </owl:Restriction>
  </rdf:type>

</owl:NamedIndividual>

```

h. Salim:

```

<owl:NamedIndividual rdf:about="#salim">
  <rdf:type rdf:resource="#etudiant"/>
  <rdf:type rdf:resource="#homme"/>
  <rdf:type rdf:resource="#medcin"/>
  <o:enfantDe rdf:resource="#karim"/>
  <o:nom>salim</o:nom>
  <o:personneAge rdf:datatype="#xsd:integer">20</o:personneAge>
  <rdf:type>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#estMarieAvec"/>
      <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
    </owl:Restriction>
  </rdf:type>

</owl:NamedIndividual>

```

i. Farid:

```

<owl:NamedIndividual rdf:about="#farid">
  <rdf:type rdf:resource="#etudiant"/>
  <rdf:type rdf:resource="#homme"/>
  <o:enfantDe rdf:resource="#karim"/>
  <o:estMarieAvec rdf:resource="#halima"/>
  <o:nom>farid</o:nom>
  <o:personneAge rdf:datatype="#xsd:integer">23</o:personneAge>
  <rdf:type>
    <owl:Restriction>

```

```

        <owl:onProperty rdf:resource="#parentde"/>
        <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
    </owl:Restriction>
</rdf:type>

</owl:NamedIndividual>

```

j. **Halima:**

```

<owl:NamedIndividual rdf:about="#halima">
    <rdf:type rdf:resource="#femme"/>
    <o:nom>halima</o:nom>
    <o:personneAge rdf:datatype="&xsd:integer">20</o:personneAge>
<rdf:type>
    <owl:Restriction>
        <owl:onProperty rdf:resource="#parentde"/>
        <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
    </owl:Restriction>
</rdf:type>

</owl:NamedIndividual>

```

k. **Samia:**

```

<owl:NamedIndividual rdf:about="#samia">
    <rdf:type rdf:resource="#femme"/>
    <o:enfantDe rdf:resource="#samir"/>
    <o:nom>samia</o:nom>
    <o:personneAge rdf:datatype="&xsd:integer">30</o:personneAge>
<rdf:type>
    <owl:Restriction>
        <owl:onProperty rdf:resource="#estMarieAvec"/>
        <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
    </owl:Restriction>
</rdf:type>
<rdf:type>
    <owl:Restriction>
        <owl:onProperty rdf:resource="#parentde"/>
        <owl:cardinality rdf:datatype="#int">2</owl:cardinality>
    </owl:Restriction>
</rdf:type>

</owl:NamedIndividual>

```

l. **Widad:**

```

<owl:NamedIndividual rdf:about="#widad">
    <rdf:type rdf:resource="#femme"/>
    <rdf:type rdf:resource="#medcin"/>
    <o:enfantDe rdf:resource="#samia"/>
    <o:nom>widad</o:nom>
    <o:personneAge rdf:datatype="&xsd:integer">20</o:personneAge>

```

```

<rdf:type>
  <owl:Restriction>
    <owl:onProperty rdf:resource="#estMarieAvec"/>
    <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
  </owl:Restriction>
</rdf:type>

</owl:NamedIndividual>

```

m. Selma:

```

<owl:NamedIndividual rdf:about="#selma">
  <rdf:type rdf:resource="#femme"/>
  <rdf:type rdf:resource="#medcin"/>
  <o:enfantDe rdf:resource="#samia"/>
  <o:nom>selma</o:nom>
  <o:personneAge rdf:datatype="&xsd:integer">20</o:personneAge>
  <rdf:type>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#estMarieAvec"/>
      <owl:cardinality rdf:datatype="#int">0</owl:cardinality>
    </owl:Restriction>
  </rdf:type>
</owl:NamedIndividual>

```

4) Vérification de la consistance de l'ontologie :

Après avoir starter le reasoner, nous remarquons qu'aucune erreur n'est apparue.

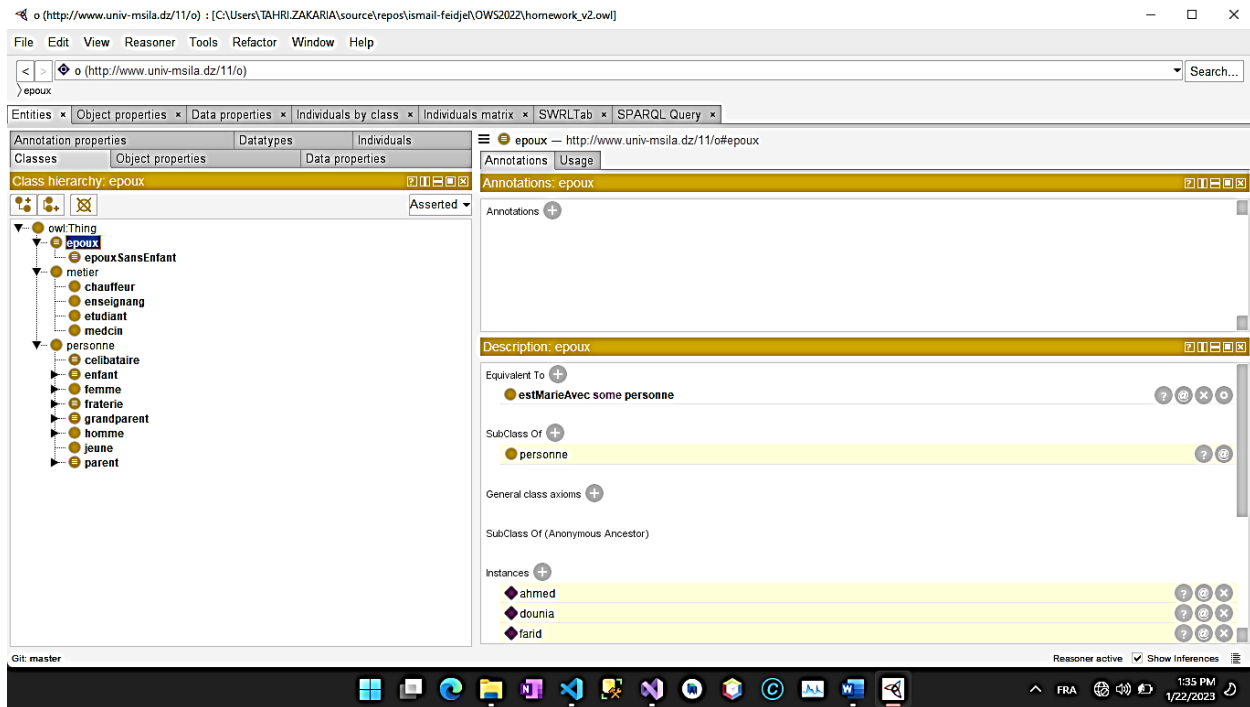


Figure 1 : la consistance de l'ontologie en Protege 5.0

5) Inférence les individus des classes et les relations de cette ontologie :

- a. **Ahmed** : Homme, époux, grandpère, parenttype, peredefamnombreux, peretype.
- b. **Amel** : Etudiant, femme, fille, jeune, sœur,celebataire.
- c. **Dounia** : Femme, épouxsansenfants.
- d. **Farid** : Etudiant, homme, épouxsansenfants, fils, frère.
- e. **Hala** : femme, épouxsansenfants.
- f. **Halima** : femme, épouxsantenfants, jeune.
- g. **Karim** : Homme, époux, fils, père, frère, oncle,parentnormal,parenttype,peretype.
- h. **Rokaya** : femme, époux, mère.grandmere, parentchoye
- i. **Salim** : Etudiant, homme, médecin, fils, frère, jeune, celebataire.
- j. **Samia** : Femme, fille,meredefilles ,parentheureuse
- k. **Samir** : homme, époux, fils, oncle, grandpere,parentchoye.
- l. **Selma** : femme, médecin, fille, jeun, sœur, celebataire.
- m. **Widad** : femme, médecin, fille, jeun, sœur, celebataire.

6) Les requête SPARQL :

- a. **Les noms des neveux de Ahmed :**

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX o: <http://www.univ-msila.dz/11/o#>
SELECT      ?nom

    WHERE {
        ?uriAhmed o:nom "ahmed".
        ?uriEnfant o:enfantDe ?uriAhmed.
        ?uriEnfant o:nom ?nom
    }

```

b. Les noms des parents ayant au moins deux enfants :

i. Methode 1 :

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX o: <http://www.univ-msila.dz/11/o#>
SELECT      ?nom ?parent(COUNT(*) AS ?count_enfants)

    WHERE { ?enfant o:enfantDe ?parent .
             ?parent o:nom ?nom}
    GROUP BY ?parent ?nom
    having (?count_enfants >= 2)

```

ii. Methode 2 :

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX o: <http://www.univ-msila.dz/11/o#>
SELECT distinct      ?nom

    WHERE {
        ?enfant1 o:enfantDe ?parent .
        ?enfant2 o:enfantDe ?parent .
        ?parent o:nom ?nom.
        filter(?enfant1 != ?enfant2)}

```

c. Les noms des oncles de Selma :

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX o: <http://www.univ-msila.dz/11/o#>
SELECT distinct ?nom

    WHERE {
        o:samia o:enfantDe ?parent .
        ?parent o:enfantDe ?grandparent .
        ?oncle o:enfantDe ?grandparent .
        ?oncle rdf:type o:homme .
        ?oncle o:nom ?nom

        filter(?parent !=?oncle)
    }
```

d. Les noms des cousins et les cousines de Samia :

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX o: <http://www.univ-msila.dz/11/o#>
SELECT distinct ?nom

    WHERE {
        o:samia o:enfantDe ?parent .
        ?parent o:enfantDe ?grandparent .
        ?oncle o:enfantDe ?grandparent .
        ?oncle rdf:type o:homme .
        ?oncle o:nom ?nom
        filter(?parent != ?oncle)
    }
```

e. Les noms des étudiants :

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX o: <http://www.univ-msila.dz/11/o#>
SELECT ?nom
    WHERE
```

```
{  
  ?uti rdf:type o:etudiant .  
  ?uti o:nom ?nom  
}
```