Description Logic Form

The TPTP Infrastructure

- Data: TPTP Library, TPTP Language, SZS Ontology, TSTP Library
- Tools: TPTP2X and TPTP4X, BNF-based Parsers, SystemOnTPTP

Adding Description Logic

- State-of-the-Art
  - Data: Fragmented collections, XML-based languages, more (help!)
  - Tools: Protege-OWL API, Protege, more (help!)
- TPTP DLF
  - Data: As for existing TPTP logical forms
  - Tools: As for existing TPTP logical forms
- First Steps
  - DLF language (click)
  - Translate to DLF from collections, using Protege-API
  - Export RDF/XML from TPTP, using TPTP2X

```
<?xml version="1.0"?>

<!DOCTYPE rdf:RDF [
     <!ENTITY owl "http://www.w3.org/2002/07/owl#" >
     <!ENTITY xsd "http://www.w3.org/2001/XMLSchema#" >
     <!ENTITY rdfs "http://www.w3.org/2000/01/rdf-schema#" >
     <!ENTITY rdf "http://www.w3.org/1999/02/22-rdf-syntax-ns#">
]>

<rdf:RDF xmlns="http://www.tptp.org/ontologies/CoffeeOntology#"
     xml:base="http://www.tptp.org/ontologies/CoffeeOntology"
     xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
     xmlns:owl="http://www.w3.org/2002/07/owl#"
     xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
     xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">
     <owl:Ontology rdf:about="http://www.tptp.org/ontologies/CoffeeOntology"/>

     <owl:ObjectProperty
       rdf:about="http://www.tptp.org/ontologies/CoffeeOntology#favoriteDrink">
        <rdfs:domain
         rdf:resource="http://www.tptp.org/ontologies/CoffeeOntology#drink"/>
        <rdfs:range
         rdf:resource="http://www.tptp.org/ontologies/CoffeeOntology#person"/>
     </owl:ObjectProperty>

     <owl:Class
         rdf:about="http://www.tptp.org/ontologies/CoffeeOntology#drink"/>

     <owl:Class
         rdf:about="http://www.tptp.org/ontologies/CoffeeOntology#person"/>

     <owl:NamedIndividual
       rdf:about="http://www.tptp.org/ontologies/CoffeeOntology#coffee">
          <rdf:type
         rdf:resource="http://www.tptp.org/ontologies/CoffeeOntology#drink"/>
     </owl:NamedIndividual>

     <owl:NamedIndividual
       rdf:about="http://www.tptp.org/ontologies/CoffeeOntology#negin">
          <rdf:type
         rdf:resource="http://www.tptp.org/ontologies/CoffeeOntology#person"/>
     </owl:NamedIndividual>
</rdf:RDF>
```

```
%--------------------------------------------------------------------------
%----One slide for Nikolaj
%----include('SYN001~0.ax').
%--------------------------------------------------------------------------
dlf(owl_defn,     definition, owl       := 'http://www.w3.org/2002/07/owl' ).
dlf(rdf_defn,     definition, rdf       := 'http://www.w3.org/1999/02/22-rdf-syntax-ns' ).
dlf(xml_defn,     definition, xml       := 'http://www.w3.org/XML/1998/namespace' ).
dlf(xsd_defn,     definition, xsd       := 'http://www.w3.org/2001/XMLSchema' ).
dlf(rdfs_defn,    definition, rdfs      := 'http://www.w3.org/2000/01/rdf-schema' ).

dlf(class_defn,   definition, class     := $tType ).
dlf(thing_defn,   definition, thing     := &owl#Thing ).
dlf(nothing_defn, definition, nothing   := &owl#Nothing ).
%--------------------------------------------------------------------------
dlf(ontology_defn,definition, $ontology := 'http://www.tptp.org/SYN001~0' ).
dlf(base_defn,    definition, $base     := &($ontology)# ).

dlf(class1_type,type, class1  : &class ).
dlf(class2_type,type, class2  : &class ).
dlf(class3_type,type, class3  : &class ).
dlf(class4_type,type, class4  : &class ).

dlf(role1_type, type, role1   : ( &thing * &thing ) > $o ).
dlf(role2_type, type, role2   : ( class1 * &thing ) > $o ).
dlf(role3_type, type, role3   : ( class1 * class2 ) > $o ).
dlf(role4_type, type, role4   : ( (class1 ++ class2) * &thing ) > $o ).

dlf(individual1_type,type, a1 : class1 ).
dlf(individual2_type,type, a2 : class1 ).

dlf(a1_is_different_individual_to_a2,axiom,
    a1 != a2).

dlf(a1_is_role1_related_to_a2,axiom,
    role1(a1,a2)).

dlf(class1_is_disjoint_with_class2,axiom,
    class1 <> class2 ).

dlf(class1_is_equivalent_to_collection_of_a1_a2_and_a3,axiom,
    class1 = [a1,a2,a3] ).

dlf(class1_is_equivalent_to_Nothing,axiom,
    class1 = &nothing ).

dlf(class1_is_equivalent_to_all_individuals_in_role_with_class,axiom,
    class1 = ! role1(_,class2) ).

dlf(class1_is_equivalent_to_union_2,axiom,
    ( class1 = ( class2 ++ class3 ++ class4 ))).

dlf(axiom_3,axiom,
    ( class1 = ( ( class2 ++ class3 ) ** ? role1(_,-class4) ** class4 ))).

dlf(role1_is_functional,axiom,
    $functional(role1)).

dlf(role1_is_super_property_of_chain_role2_and_role3_and_role4_1,axiom,
    ( role1 >> ( role2 @ role3 @ role4 ))).


%--------------------------------------------------------------------------
```