Description of Algorithm for DL Support Set Computation

1. construction of a TBox classification: Parse ontology and for each triple in it, add the respective fact to ASP program P.
   - C rdf:type owl:Class: op(C,negC), sub(C,C)
   - R rdf:type owl:ObjectProperty: op(R,negR), sub(R,R), op(exR,negexR), sub(exR,exR)
   - C rdf:type owl:subClassOf D: sub(C,D)
   - R rdf:type owl:subPropertyOf Q: sub(R,Q)
   - C owl:disjointWith D: sub(C,negD)
   - R owl:propertyDisjointWith Q: sub(R,negQ)
   - R rfds:domain Q: sub(exR,Q)

   Further rules for P are:
   sub(X,Z):-sub(X,Y),sub(Y,Z).
   sub(Y',X'):-op(X,X'),op(Y,Y'),sub(X,Y).
   conf(X,Y):-op(X,Y),sub(X,Y).
   op(X,Y):-op(Y,X).
   There will be a unique answer set of P, let it call A.
2. Given an external atom $cDL[c^+, c^-, r^+, r^-, Q](X)$ (concept query) and maximal extensions of its input predicates, construct a set of support sets $\mathcal{S}$ for it in the following way. Compute all unary support sets:
   - for each $c^+(C, X)$:
     If Tsub(C,Q) is in A, then add $Tc^+(C, X)$ to $\mathcal{S}$;
     If conf(C,C) is in A, then add $Tc^+(C, Y)$ to $\mathcal{S}$;
   - for each $c^-(C, X)$:
     If sub(negC,Q) is in A, then add $Tc^-(C, X)$ to $\mathcal{S}$;
   - for each $r^+(R, X, Y)$:
     If sub(exR,Q) is in A, then add $Tr^+(R, X, Y)$ to $\mathcal{S}$;
   - for each $r^-(R, X, Y)$:
     If sub(negexR,Q) is in A, then add $Tr^-(R, X, Y)$ to $\mathcal{S}$;
   - add $Q(X)$ to $\mathcal{S}$;

   Compute all support sets where the set of input predicates is empty:
   - If sub(C,Q) is in A, then
     - if C is of form exR, add $R(X, Y)$ to $\mathcal{S}$;
     - otherwise add $C(X)$ to $\mathcal{S}$

   Compute binary support sets:
   - for each $c^+(C, X)$:
     If Tsub(C,C') is in A then add $\{Tc^+(C, Y), negC'(Y)\}$ to $\mathcal{S}$. If $c^-(C', Y)$ occurs in the maximal interpretation, then add $\{Tc^+(C, Y), Tc^-(C', Y)\}$.
   - for each $r^+(R, x, y)$:
     If Tsub(exR,C) is in A then add $\{Tr^+(R, X, Y), negC(X)\}$ to $\mathcal{S}$;
     If Tsub(R,R') is in A then add $\{Tr^+(R, X, Y), negR'(X, Y)\}$ to $\mathcal{S}$;