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MACHINE
    SubClassOf_Solve
INCLUDES
    xOwl,LibraryStrings
DEFINITIONS
    "LibraryStrings.def" ;
    SET_PREF_DEFAULT_SETSIZE == 25 ;
    SET_PREF_MAX_OPERATIONS == 20 ;
    SET_PREF_SHOW_EVENTB_ANY_VALUES == TRUE ;

    subClassGoal(iri1,iri2) == $(name^{-1}(iri1), name^{-1}(iri2)) \in inheritence \wedge Axiom =$
dom(axioms) ;

    inheritence == $((subClassExp \,;\, classOfClassExp)^{-1} \,;\, (superClassExp \,;\, classOfClassExp))$ ;

    disjunctionExp == $classOfClassExp \otimes disjointClassExp$ ;

    disjunction == $(\mathbf{ran}(disjunctionExp) \,;\, \mathbf{ran}(disjunctionExp)^{-1}) - \mathbf{id}(Class)$ ;

    super(cls) ==  closure(inheritence)[cls] ;

    inconsistentClasses == $\{cl \mid cl \in Class \wedge disjunction[super(\{cl\})] \cap super(\{cl\}) \neq \emptyset\}$

VARIABLES
    newClass, newDecl, newSubClass,
    exp1, exp2, ontology
INVARIANT
    $newClass \in ENTITY \wedge newDecl \in AXIOM \wedge newSubClass \in AXIOM$
     $\wedge\ exp1 \in CLASSEXPRESSION \wedge exp2 \in CLASSEXPRESSION$
     $\wedge\ ontology \in XOwl$

     $\wedge\ \mathbf{closure1}(inheritence) \cap \mathbf{id}(Class) = \emptyset$       $\wedge\ inconsistentClasses = \emptyset$
INITIALISATION

    newClass :$\in$ (ENTITY - Entity) ||
    ANY a1, a2, e1, e2 WHERE
        $a1 \in AXIOM$ - Axiom
         $\wedge\ a2 \in AXIOM$ - Axiom
         $\wedge\ e1 \in CLASSEXPRESSION$ - ClassExpression
         $\wedge\ e2 \in CLASSEXPRESSION$ - ClassExpression
         $\wedge\ a1 \neq a2$
         $\wedge\ e1 \neq e2$
    THEN
        newDecl := a1 ||
        newSubClass := a2 ||
        exp1 := e1 ||
        exp2 := e2
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  END ||
  ontology :∈ XOwl

OPERATIONS
alternative ← applySubClassOf(iri1, iri2) =
  PRE $iri1 \in STRING \land iri2 \in STRING$ THEN
    ANY
      cl1, cl2
    WHERE
      $cl1 \in Class \land cl2 \in Class$
       $\land\ Entity\_name(cl1) = iri1 \land Entity\_name(cl2) = iri2$
       $\land\ cl2 \notin super(\{cl1\})$
       $\land\ (\mathbf{closure1}(inheritence \cup \{(cl1 \mapsto cl2)\}) \cap \mathbf{id}(Class) = \emptyset\ )$
       $\land\ disjunction[super(\{cl1,cl2\})] \cap super(\{cl1,cl2\}) \neq \emptyset$
    THEN
      Class_NEW(newClass) ;
      Declaration_NEW(newDecl) ;
      Declaration_SetEntity(newDecl, newClass) ;

      ClassExpression_NEW(exp1);
      ClassExpression_NEW(exp2);

      ClassExpression_SetClass(exp1, newClass) ;
      ClassExpression_SetClass(exp2, cl1) ;
      VAR
        name1, name2
      IN
        name1 := STRING_CONC([iri1,”_”,iri2]) ;
        name2 := STRING_CONC([TO_STRING(Entity_name[inheritence[{cl1}]]),”_”,iri2])
;
        CHOICE
          SubClassOf_NEW(newSubClass, exp1, exp2);
          Entity_SetName(newClass, name1) ;
          alternative := ”SubClassing”
        OR
          SubClassOf_NEW(newSubClass, exp2, exp1);
          Entity_SetName(newClass, name2) ;
          alternative := ”SuperClassing”
        END
      END ;
      xOwl_AddAxioms(ontology, newDecl) ;
      xOwl_AddAxioms(ontology, newSubClass)
    END
  END

END
```