

CS 724 Assignment Three: First-Order Logic and Prolog

1. Unifiable Predicates

- a) $P(B,A,B), P(x,y,z)$ – This is not unifiable because the predicates do not match
- b) $P(x,x), Q(A,A)$ – This is unifiable because the predicates are matching
- c) $\text{Older}(\text{Father}(y),y), \text{Older}(\text{Father}(x),\text{John})$. – This is unifiable because the predicates are arranged in an orderly manner
- d) $Q(G(y,z),G(z,y)), Q(G(x,x),G(A,B))$ – This is not unifiable because the predicates are not matching and are not arranged in a logical order
- e) $P(f(x), x, g(x)), P(f(y), A, z)$ – This predicate is not unifiable because it is not matching and most of them are not arranged in order

2. $\forall x \neg \text{pride}(x) \vee \text{smart}(x)$
 $\text{pride}(\text{Tom})$

The above statements show that Tom is not kind because he has pride even though he is smart and can teach.

3. $\forall x,y T(x,y,x) \Rightarrow Q(x,y)$

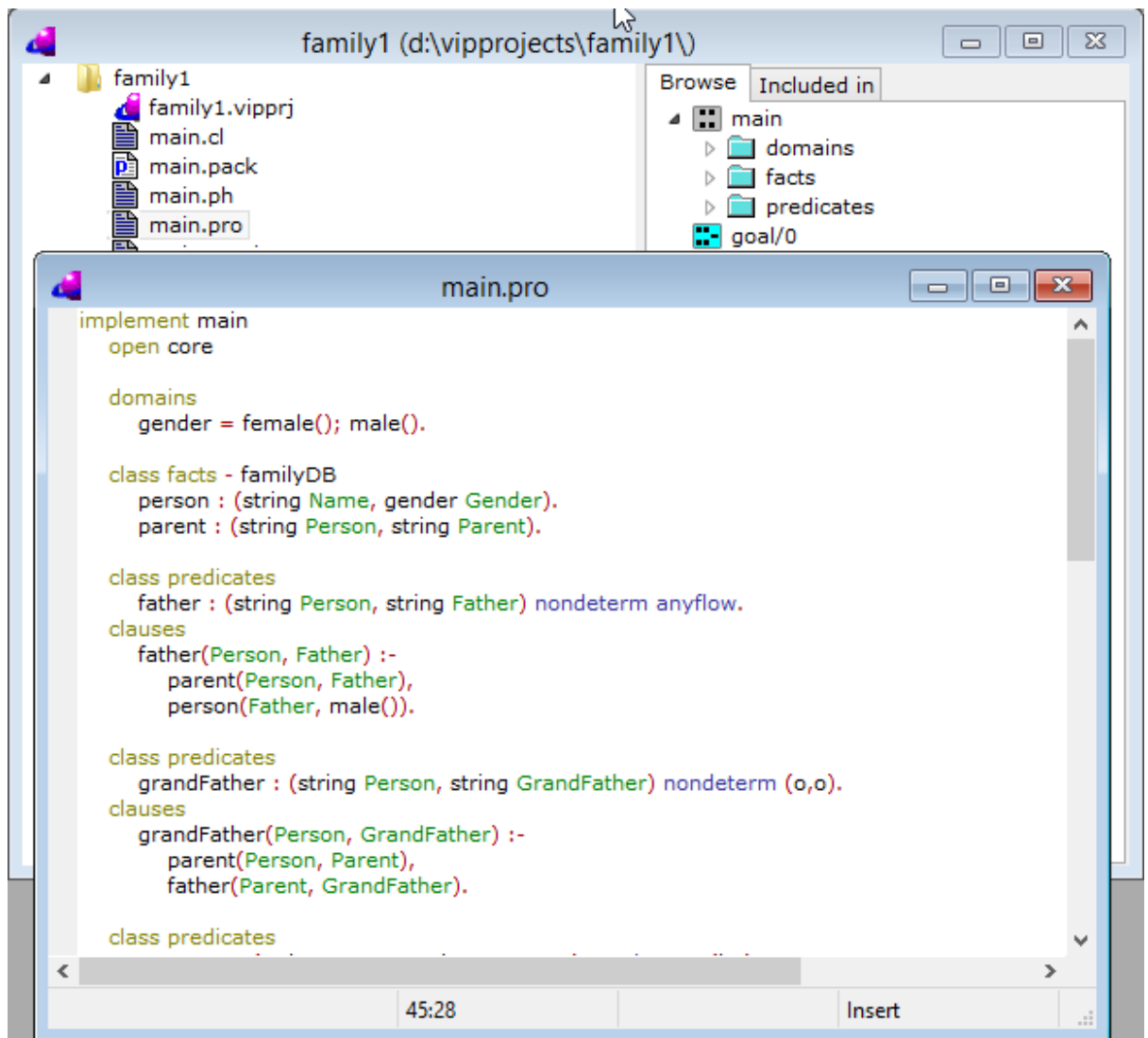
$$\forall x,y S(x,y) \Rightarrow Q(y,x)$$

$$\forall x,y S(x,\text{Bob}) \wedge S(y,x) \Rightarrow P(x,y)$$

$$S(\text{Alice})$$

$$T(\text{Alice})$$

4. SWI – Prolog



- a) $P(f(x), h(y)) \vee Q(y)$
 $\neg P(f(fx(w)), h(g(w)))$
- b) $\{ fx(g(u))/x, g(g(u))/y$
 $g(u)/w \}$
- c) i) Andrew
 ii) William, Harry, Peter, Zara, Beatrice and Eugenie
 iii) George and Mum
 iv) Anne and Sarah
 v) Charles, Mark and Edward

```
Translator.pro (Generation\CodesGeneration\Translator\)  
42:42 Insert Indent  
endPredicate : (string FileName) language apicall as "?GEN_endPredicate@Generatic  
p6transX : () language apicall as "?GEN_Trans6X@Generation@Compiler@VIP@YG  
  
clauses  
toTarget(PredicateRE, FileName, StackFramePresent, LocalStaticSize) :-  
    CodeSegment = objectFile::getPredicateCodeSegment(),  
    CurrentSegment = objectFile::setCurrentSegment(CodeSegment),  
    if true = compilerState::isDiagnosticNewFeature then  
        beginPredicate_F(PredicateRE, LocalStaticSize, FileName, StackFramePresent)  
        viOptimization(),  
        viGeneration(),  
        endPredicate_F(FileName)  
    else  
        beginPredicate(PredicateRE, LocalStaticSize, log::writeString, FileName, Stack  
p6transX(),  
        endPredicate(FileName),  
        virType::vi_ClearIndex()  
    end if,  
    _ = objectFile::setCurrentSegment(CurrentSegment).  
  
% ---  
  
class facts - p6trans_db  
predicateRE : referredEntity := cReferredEntitiesManagement::absentRE_const.  
lastLineNo : core::lineNumber := virType::absentLineNo.  
currentPredEntryPC : objectFile::programCount := 0.  
needsPredicateProfiling : boolean := !true,  
localStaticSize : basicTypes::size := 0. % int ?  
aux : unsigned := 0.  
stackFramePresent : boolean := true.  
p6transX : boolean := false.
```