

Exercises for the Course  
Logic Programming Engineering

(Author: Dr. W. Nauber)

Dr Paola Bruscoli, Peter Steinke, Amin Timany

Practical 1

Introduction: Facts, Database Questions, Negation as Failure, Rules, Trace

---

---

**Exercise 2.1**

The following facts are given:

```
male([ali, carl, ed, frank, hugo, kurt, rene, tino, vico]).  
  
female([berta, dora, guna, ina, jane, laura, mia, olga, wera, susan, uta]).  
  
father(ali, [guna, hugo]).      father(carl, [ina, jane]).  
father(ed, [kurt]).            father(frank, [mia, olga]).  
father(hugo, [wera, rene, vico]). father(kurt, [tino, uta]).  
  
mother(berta, [guna, hugo]).    mother(dora, [ina, jane]).  
mother(guna, [mia, olga]).      mother(ina, [wera, rene, vico]).  
mother(jane, [susan]).          mother(laura, [tino, uta]).
```

You can get this database as a file *lfamily.pl* from the homepage of Logic Programming Engineering.

Define rules for

- lparents(PL, CL) – PL is a list of parents ([Father, Mother]) and CL a list of all their children.  
Examples: ? – lparents(PL, [wera, rene, vico]). gives  $PL = [hugo, ina]$ .  
? – lparents([F, dora], CL). gives  $F = carl$  and  $CL = [ina, jane]$ .
- lbrother(B, C) - B is brother of C.  
Example: ? – lbrother(rene, C). gives  $C = wera$  and  $C = vico$ .  
Hint: Use the system predicate *member(Elem, List)*.
- lgrandpa(G, C) - G is grandpa of C.  
Example: ? – lgrandpa(ed, C). gives  $C = tino$  and  $C = uta$ .

**Exercise 2.2**

- Define a predicate *dellastelem(List, DList)* which deletes the last element of a list.  
Example: ? – dellastelem([5, 3, 6, 2], DList) gives  $DList = [5, 3, 6]$ .
- Define a predicate *scalar(Vector1, Vector2, S)* which for two given vectors of integers computes their scalar product *S*.  
Example: ? – scalar([3, 2, 5], [5, 3, 6], S) gives  $S = 51$ .  
Hint: Use the system predicate *is* to assign a variable a value.
- Define a predicate *delduplelems(List, DList)* which deletes the duplicate elements of a list beginning from the left.  
Example: ? – delduplelems([5, 3, 6, 2, 2, 3, 2, 6], DList) gives  $DList = [5, 3, 6, 2]$ .