Exercise 1

Foundations of Logic Programming

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Exercise 1.1

Using the Prolog program from Slides I/3-I/6, give the answer for the following queries:

- ?-connection(frankfurt,X).
- ?-connection(X, maui).

Exercise 1.2

Define in Prolog a predicate for multiplication. (You may want to use the predicate add defined on Slide I/10.) Give the output for the following queries:

- ?-mul(s(s(0)),s(s(s(0))),Z).
- ?-mul(s(s(0)),s(s(0)),s(s(s(s(s(s(0)))))).

Exercise 1.3

Now use your definition from Exercise 1.2 to define the factorial function.

Example: $?- fact(s(s(s(0))), F)$ has the result $F = s(s(s(s(s(s(0))))))$.

Exercise 1.4

Define a predicate $palindrome(L)$ which checks if the list L is a palindrome, i.e. the reverse of L is identical to L.

Example: $?- palindrome([a, b, c, b, a])$ has result yes.

Exercise 1.5

Define a predicate $delelem(K, L, Elem, RL)$ which deletes the K-th element from list L and returns the deleted element $Elem$ and the reduced list RL.

Example: $?- delelem(4, [3, 4, 5, 4], Elem, RL)$ gives $Elem = 4$ and $RL = [3, 4, 5]$ as result.

Exercise 1.6

Define a predicate $sorted(List)$ which checks if a list of integers is sorted in weak ascending order.

Example: $?- sorted([3, 4, 4, 5])$ has result yes.