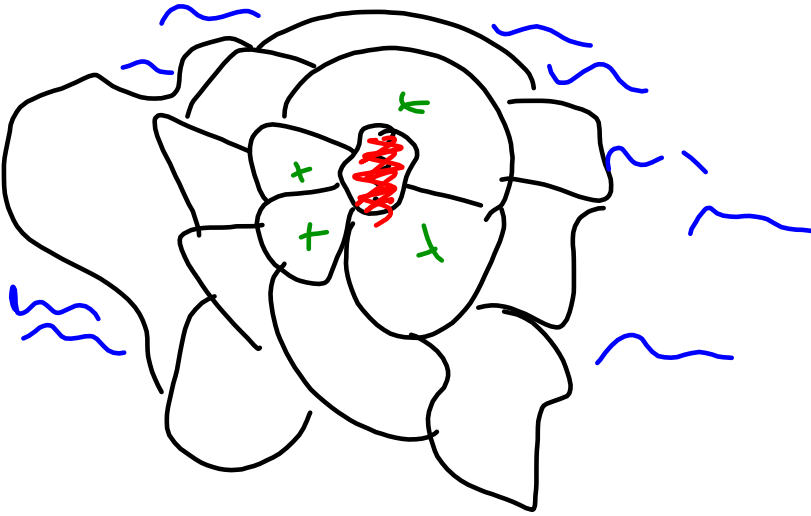


Exercise 4, Part 2

'Double-landlocked countries



Jun 12-14:08

$rl(c) :- \dots$

$dll(c) :- rl(c) \text{ and}$

$\text{not exists } c_2: \text{border}(c, c_2) \wedge \neg rl(c_2)$

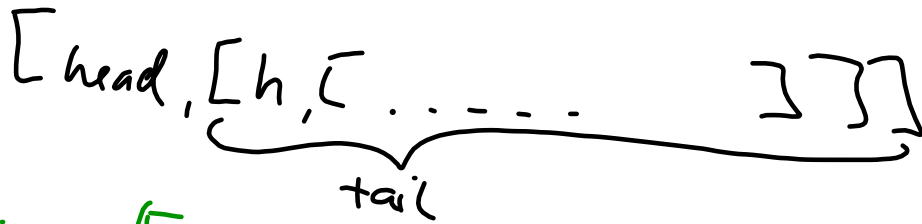
Good non-symms!

symm

$c\_has\_non\_ll\_neighbor(c) :- a[\text{nonlandlocked neighbor}]$   
 all countries that do not have

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List in Prolog

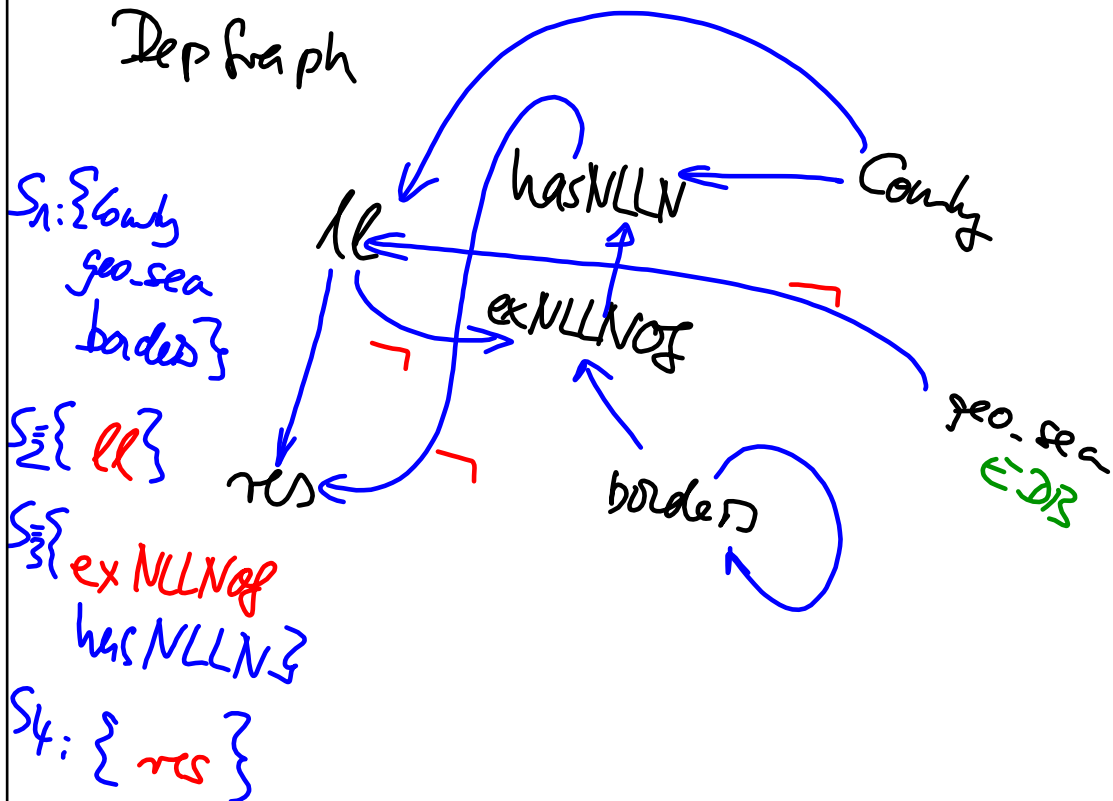


Sum:  $sum([H, T]) :- H + sum(T)$   
 $sum([H]) :- H$   
 $sum([]) :- 0$

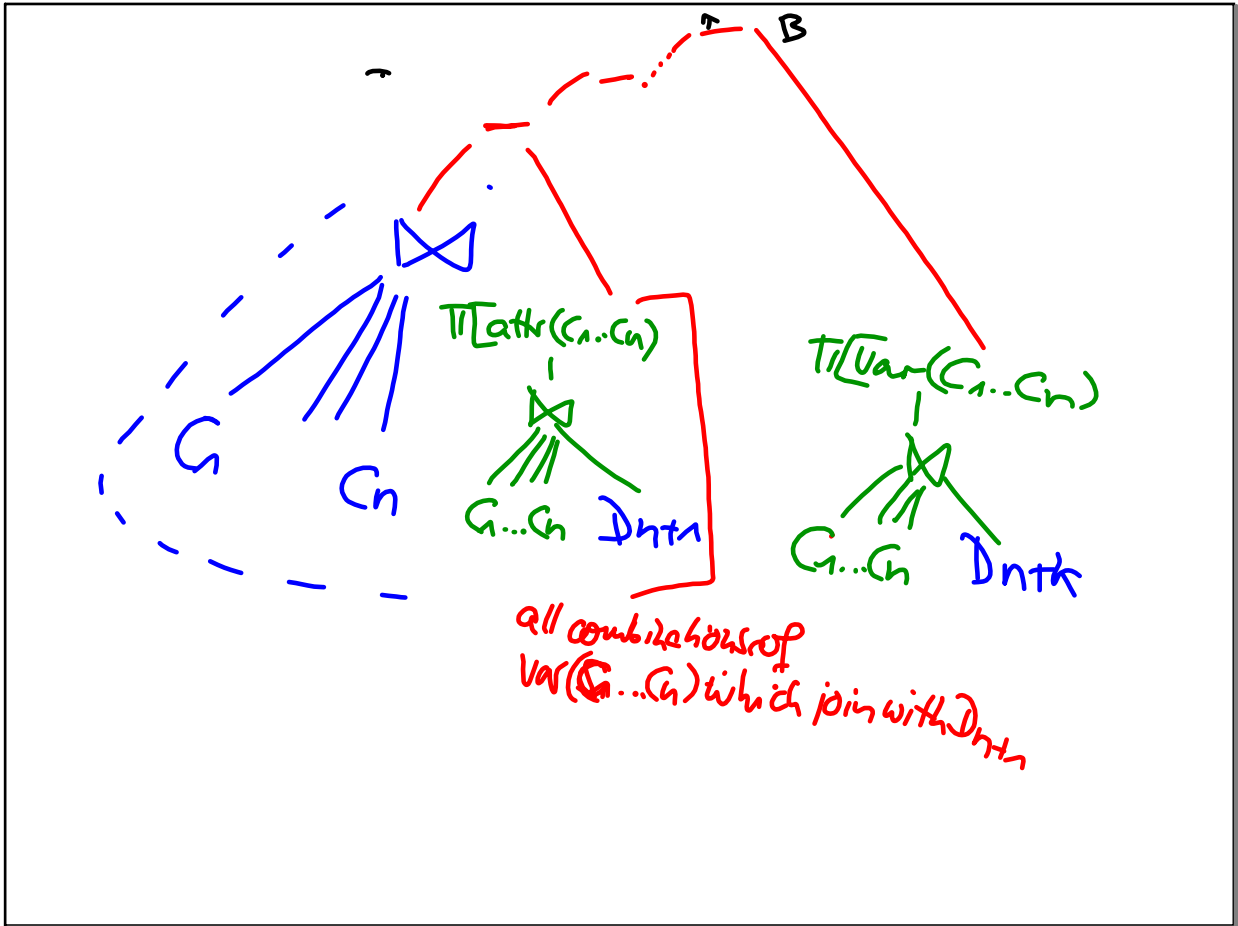
*if list is not empty and not empty*

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Dep graph



Jun 12-15:02



Jun 12-15:10

Aggregation:

- query
- group-by-attrs
- agg. expressions

Umap

Collection  
all cities

country, province

brids parking

sum(pop), max(have)

reduce

computes

Alpha:  $\gamma[groupBy, expr](query)$

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