Exercise Session Informatik III

8. Difference Lists

Background

- Alternative representation of list structures
- Incomplete data structure
- Uses unification rather that list processing
- Can yield better performance

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Examples

- [1,2,3,4,5]-[4,5] = [1,2,3]
- [1,2,3|Xs]-Xs = Xs
- Xs-Xs = []
- Xs-[] = Xs

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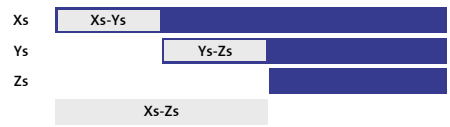
Linear Append




```
append_dl(Xs-Ys, Ys-Zs, Xs-Zs).

append_dl([1,2|Xs]-Xs, [3]-[], Z-[]).
   1  1  Call: append_dl([1,2|_234]-_234,[3]-[],_346-[]) ?
   1  1  Exit: append_dl([1,2]-[3],[3]-[],[1,2,3]-[]) ?
Z = [1,2,3],
Xs = [3] ?
```

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Reverse

```
reverse(Xs, Ys) :- reverse_dl(Xs, Ys-[]).
reverse_dl([],Xs-Xs).
reverse_dl([X|Xs],Ys-Ys1) :- reverse_dl(Xs,Ys-[X|Ys1]).

reverse_dl([1,2,3],Ys-[]).
    1  1  Call: reverse_dl([1,2,3],_239-[]) ?
    2  2  Call: reverse_dl([2,3],_239-[1]) ?
    3  3  Call: reverse_dl([3],_239-[2,1]) ?
    4  4  Call: reverse_dl([],_239-[3,2,1]) ?
    4  4  Exit: reverse_dl([],[3,2,1]-[3,2,1]) ?
    3  3  Exit: reverse_dl([3],[3,2,1]-[2,1]) ?
    2  2  Exit: reverse_dl([2,3],[3,2,1]-[1]) ?
    1  1  Exit: reverse_dl([1,2,3],[3,2,1]-[]) ?
Ys = [3,2,1] ?
```

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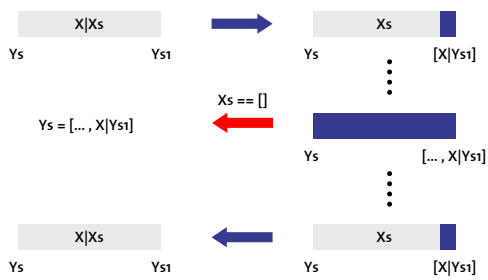
Reverse



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Uiuiui, Quicksort...

```
quicksort(Xs,Ys) :- quicksort_dl(Xs,Ys-[]).

quicksort_dl([X|Xs],Ys-Zs) :-
   partition(Xs,X,Littles,Bigs),
   quicksort_dl(Littles,Ys-[X|Ys1]),
   quicksort_dl(Bigs,Ys1-Zs).
quicksort_dl([], Xs-Xs).

partition([X|Xs],Y,[X|Ls],Bs) :-
   X =< Y,
   partition(Xs,Y,Ls,Bs).
partition([X|Xs],Y,Ls,[X|Bs]) :-
   X > Y,
   partition(Xs,Y,Ls,Bs).
partition([],_,[],[]).
```

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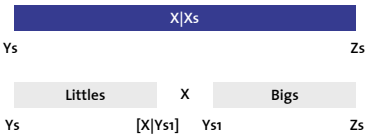
Uiuiui, Quicksort...




```
quicksort_dl([X|Xs],Ys-Zs) :-
   partition(Xs,X,Littles,Bigs),
   quicksort_dl(Littles,Ys-[X|Ys1]),
   quicksort_dl(Bigs,Ys1-Zs).
quicksort_dl([], Xs-Xs).
```

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That's all folks!

Wie geht es weiter?
- Prolog Testatübung lösen
- Fragen für Prof. Niklaus Wirth
- Ferien geniessen!

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