Linear Logic

Lecture 19: Resolution
March 19, 1998

1. IQBlock Puzzle

IQBlock: Initialization

```
MODULE iqblock.

init X Y K :- (sq X Y -o next X Y K).
next z z K :- K.
next z (s Y) K :- init z Y K.
next (s X) z K :- init X (s (s (s (s (s (s (s z))))))) K.
next (s X) (s Y) K :- init (s X) Y K.
```

IQBlock: Sample Tile

```
LINEAR
  tile blue1 (n::n::n::e::e::s::w::nil)
& tile blue2 (e::e::e::s::s::w::n::nil)
& tile blue3 (n::e::s::e::n::n::n::nil)
& tile blue4 (n::n::e::s::s::e::e::nil)
& tile blue5 (n::e::s::ne::s::s::s::nil)
& tile blue6 (e::e::e::n::n::w::s::nil)
& tile blue7 (e::e::n::w::w::n::n::nil)
& tile blue8 (e::n::w::n::e::e::e::nil).
```

IQBlock: Fitting a Tile

```
% North
fits (n :: Ds) X (s Y) K :-
  sq X Y ,
  (filled X (s Y) => fits Ds X Y K).

% East
fits (e :: Ds) (s X) Y K :-
  sq X Y ,
  (filled (s X) Y => fits Ds X Y K).

% 5 more similar cases

fits nil X Y K :- (filled X Y => K).
```

IQBlock: Finding Next Empty Square

```
findnext z z nil.
findnext z (s Y) L :- nextplace z Y L.
findnext (s X) z L :- nextplace X (s (s (s (s (s (s (s z))))))) L.
findnext (s X) (s Y) L :- nextplace (s X) Y L.

nextplace X Y L :- {filled X Y} , findnext X Y L.
nextplace X Y L :- sq X Y , place X Y L.
```

IQBlock: Placing a Square

```
place X Y (C::L) :-
      % write X , write Y , nl ,
      tile C Ds ,
      % write C , nl ,
      fits Ds X Y (findnext X Y L).
```

IQLBlock: Top Level

```
solve L :- init (s (s (s (s (s (s (s z)))))))
                (s (s (s (s (s (s (s z)))))))
           (nextplace (s (s (s (s (s (s (s z)))))))
                      (s (s (s (s (s (s (s z))))))) L).
```

```
Starting Lolli version 0.94, Mar 18, 1995 -ic,fp
  (built with Standard ML of New Jersey, Version 0.93,
  February 15, 1993)...
?- iqblock --o solve L.
L_1 <- blue1 :: forest1 :: tan1 :: green1 :: purple1
       :: yellow1 :: pink1 :: orange1 :: grass1 :: brown1 :: nil*
L_1 <- blue1 :: forest1 :: tan1 :: green1 :: purple1
       :: brown4 :: orange5 :: grass1 :: pink1 :: yellow1 :: nil;
```