

Experiment No.: 2

8 queen problem

Code:

```
use_module(library(lists)).

/*
N-queens problem solved in Prolog (SWI-Prolog or GNU Prolog).
Usage: n_queen(4,X).
*/

n_queen(N, Solution) :-
    %create a list of N dummy variables
    length(Solution, N),
    queen(Solution, N). %search for a configuration of N queens

%returns a list of integer from K to N included es up2N(1,3,X) X = [1,2,3]
up2N(N,N,[N]) :-!.
up2N(K,N,[K|Tail]) :- K < N, K1 is K+1, up2N(K1, N, Tail).

queen([],_). %No queens is a solution for any N queens problem. All queens
are in a safe position.

queen([Q|Qlist],N) :-
    queen(Qlist, N), %first we solve the subproblem
    %we then generate all possible positions for queen Q
    up2N(1,N,Candidate_positions_for_queenQ),
    %we pick one of such position
    member(Q, Candidate_positions_for_queenQ),
    %we check whether the queen Q is safe
    check_solution(Q,Qlist, 1).
check_solution(_,[], _).
check_solution(Q,[Q1|Qlist],Xdist) :-
    Q =\= Q1, %not on the same row
    Test is abs(Q1-Q),
    Test =\= Xdist, %diagonal distance
    Xdist1 is Xdist + 1,
    check_solution(Q,Qlist,Xdist1).
```

Output:

```
SWI-Prolog (AMD64, Multi-threaded, version 9.2.6)
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 9.2.6)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.

For online help and background, visit https://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?-
ERROR: [Thread pcs] c:/users/nayan/documents/btech/3-4 year/7 sem/ai/lab/practicals/practi-2.pl:14:4: Syntax error: Operator expected
% c:/Users/nayan/Documents/Btech/3-4 year/7 sem/AI/Lab/Practicals/practi-2.pl compiled 0.00 sec, 9 clauses
?-

?- n_queens(4,X).
Correct to: "n_queen(4,X)"? yes
X = [3, 1, 4, 2]
Unknown action: ☐ (h for help)
Action?
Unknown action: ☐ (h for help)
Action?
Unknown action: ☐ (h for help)
Action? .

?- n_queens(10,X).
Correct to: "n_queen(10,X)"? yes
X = [7, 4, 2, 9, 5, 10, 8, 6, 3|...] .

?-
|
n_queens(10,X).
Correct to: "n_queen(10,X)"?
Please answer 'y' or 'n'? yes
X = [7, 4, 2, 9, 5, 10, 8, 6, 3|...] .

?- n_queens(4,[3,1,4,2]).
Correct to: "n_queen(4,[3,1,4,2])"?
Please answer 'y' or 'n'? yes
true .

?- n_queens(4,[3,1,4,1]).
Correct to: "n_queen(4,[3,1,4,1])"?
Please answer 'y' or 'n'? yes
false .

?-
```