Fr. Conceicao Rodrigues College of Engineering Fr. Agnel Ashram, Bandstand, Bandra (W), Mumbai - 400050

Department of Computer Engineering Academic Term II: 23-24

Class: B.E (Computer), Sem – VI Subject Name: Artificial Intelligence Student

Name: Nimish Ravindra Patil **Roll No: 9565**

Practical No:	**8**
Title:	Programming in PROLOG
Date of Performance:	**25/03/2024**
Date of Submission:	**01/04/2024**

Rubrics for Evaluation:

Sr. No	Performance Indicator	Excellent	Good	Below Average	Marks
1	On time Completion & Submission (01)	01 (On Time)	NA	00 (Not on Time)	
2	Logic/Algorithm Complexity analysis (03)	03(Correct)	02(Partial)	01 (Tried)	
3	Coding Standards (03): Comments/indention/Naming conventions Test Cases /Output	03(All used)	02 (Partial)	01 (rarely followed)	
4	Post Lab Assignment (03)	03(done well)	2 (Partially Correct)	1(submitted)	
Total					

Signature of the Teacher:

A) Tower of

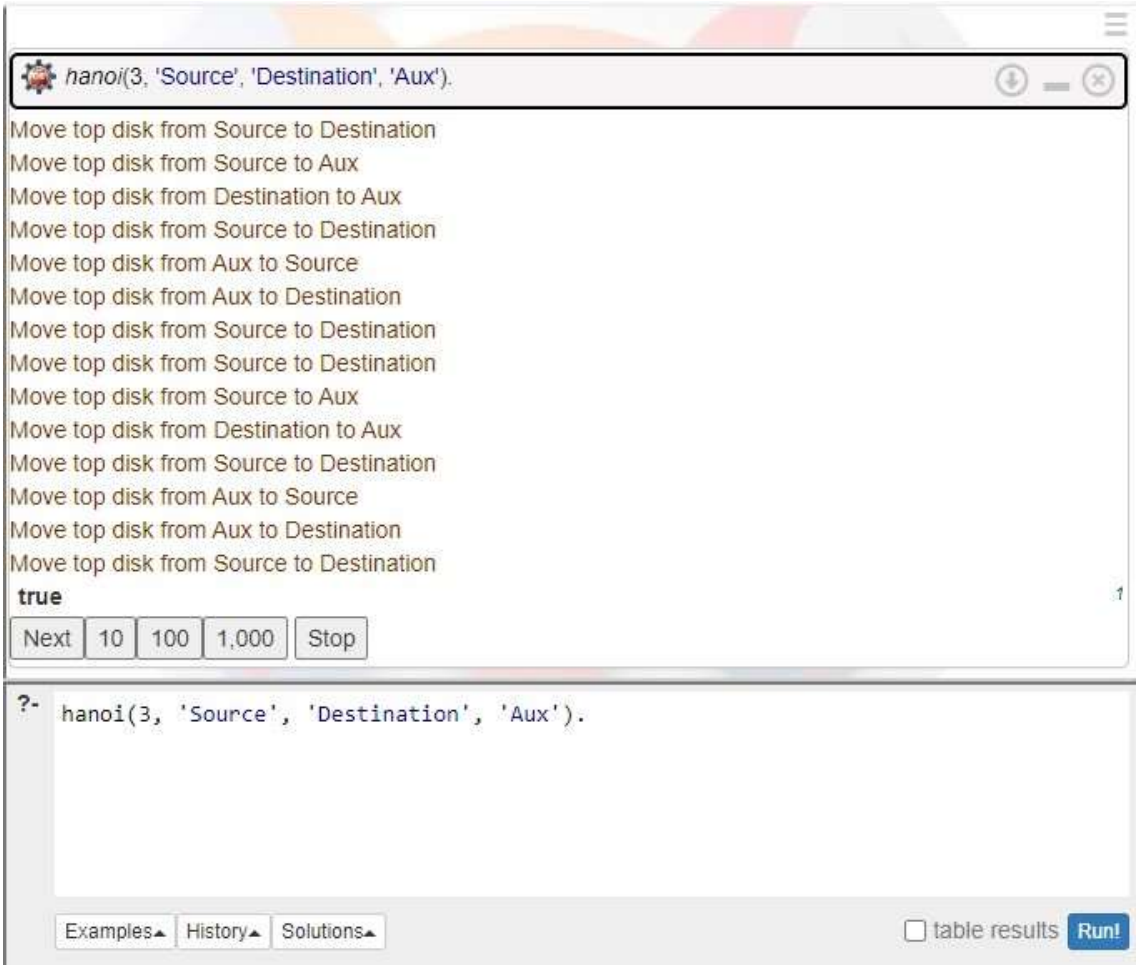
Hanoi Source code:

SWISH File Edit Examples Help

Program

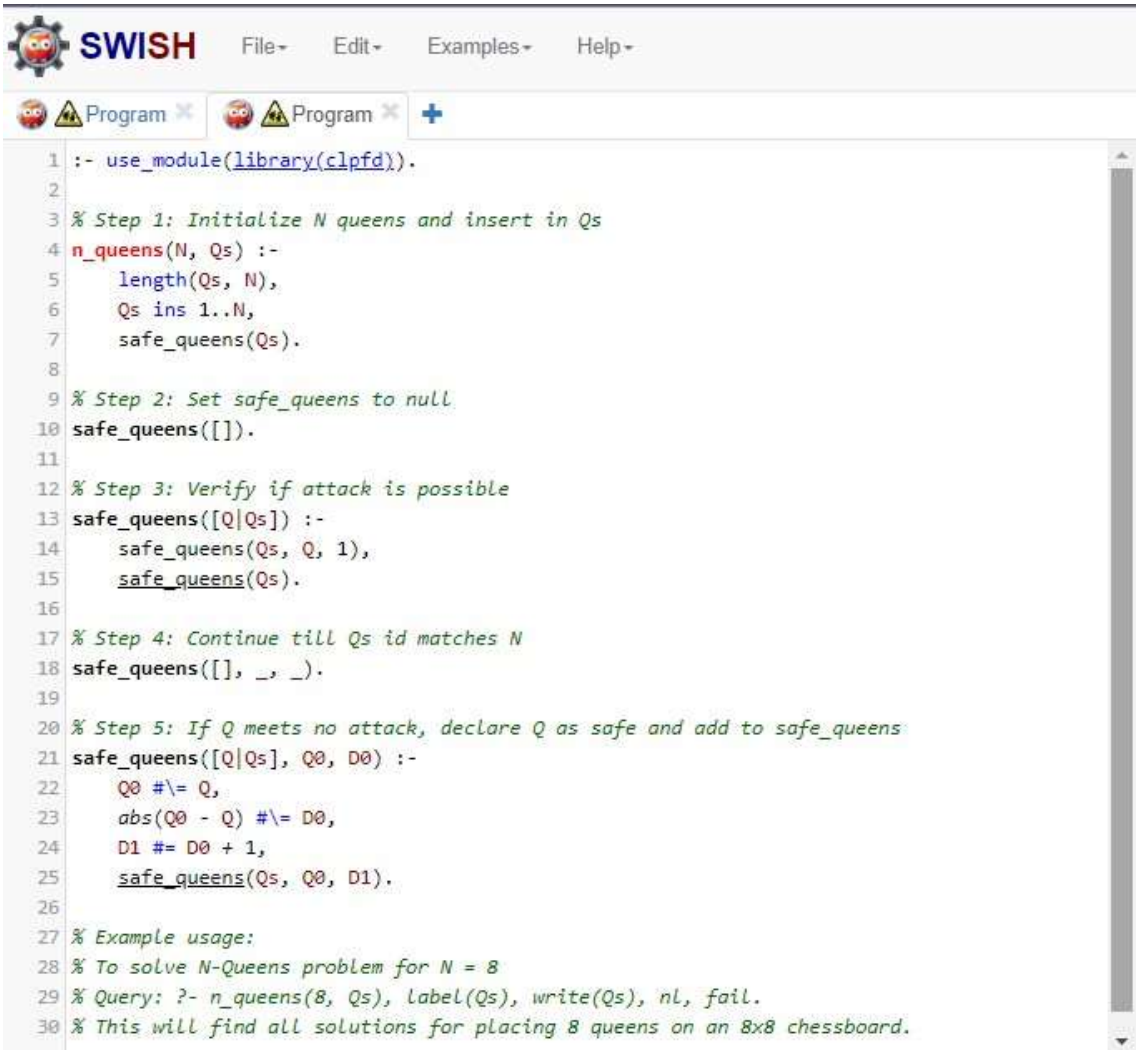
```
% Define predicate hanoi/3 for solving Tower of Hanoi problem
hanoi(1, Source, Destination, _) :-
    write('Move top disk from '),
    write(Source),
    write(' to '),
    write(Destination),
    nl.

hanoi(N, Source, Destination, Aux) :-
    N > 1,
    M is N - 1,
    hanoi(M, Source, Aux, Destination),
    hanoi(1, Source, Destination, _),
    hanoi(M, Aux, Destination, Source).

% Example usage:
% To solve Tower of Hanoi problem with 3 disks
?- hanoi(3, 'Source', 'Destination', 'Aux').
```

Output:

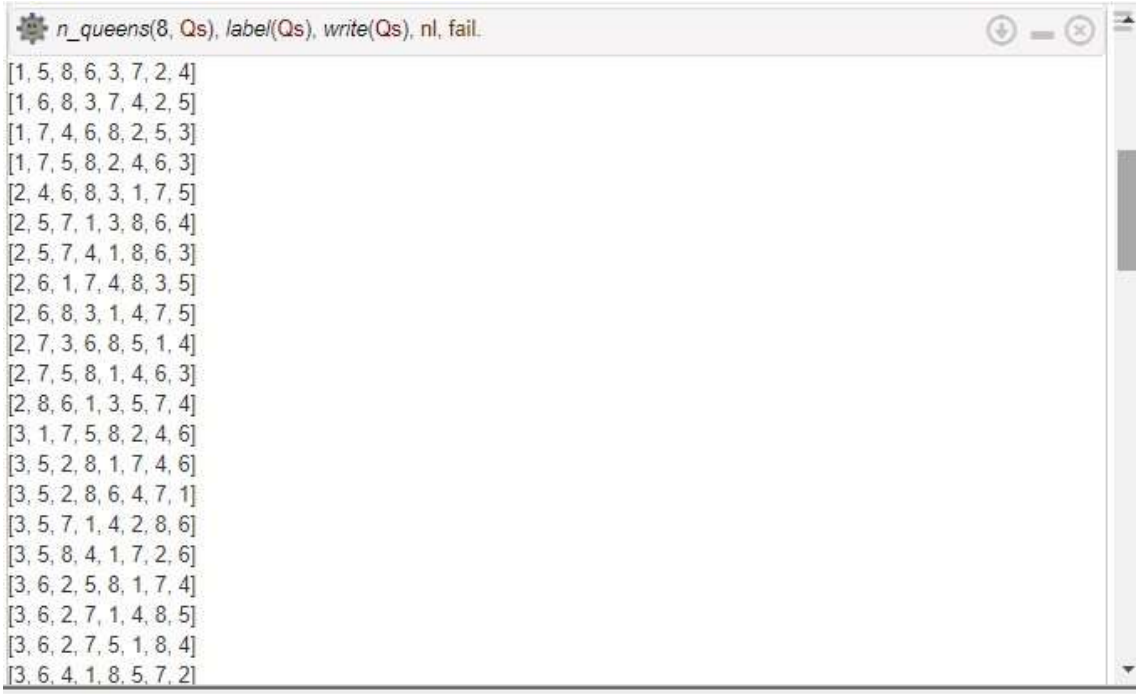


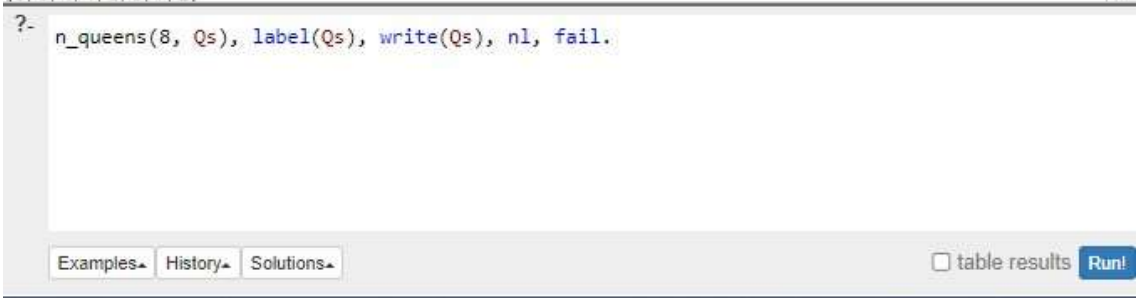
B) N-queen

Source code:


SWISH
File
Edit
Examples
Help
Program
Program
:- use_module(library(clpfd)).
% Step 1: Initialize N queens and insert in Qs
n_queens(N, Qs) :-
length(Qs, N),
Qs ins 1..N,
safe_queens(Qs).
% Step 2: Set safe_queens to null
safe_queens([]).
% Step 3: Verify if attack is possible
safe_queens([Q|Qs]) :-
safe_queens(Qs, Q, 1),
safe_queens(Qs).
% Step 4: Continue till Qs id matches N
safe_queens([], _, _).
% Step 5: If Q meets no attack, declare Q as safe and add to safe_queens
safe_queens([Q|Qs], Q0, D0) :-
Q0 #\= Q,
abs(Q0 - Q) #\= D0,
D1 #= D0 + 1,
safe_queens(Qs, Q0, D1).
% Example usage:
% To solve N-Queens problem for N = 8
% Query: ?- n_queens(8, Qs), label(Qs), write(Qs), nl, fail.
% This will find all solutions for placing 8 queens on an 8x8 chessboard.

Output:


n_queens(8, Qs), label(Qs), write(Qs), nl, fail.
[1, 5, 8, 6, 3, 7, 2, 4]
[1, 6, 8, 3, 7, 4, 2, 5]
[1, 7, 4, 6, 8, 2, 5, 3]
[1, 7, 5, 8, 2, 4, 6, 3]
[2, 4, 6, 8, 3, 1, 7, 5]
[2, 5, 7, 1, 3, 8, 6, 4]
[2, 5, 7, 4, 1, 8, 6, 3]
[2, 6, 1, 7, 4, 8, 3, 5]
[2, 6, 8, 3, 1, 4, 7, 5]
[2, 7, 3, 6, 8, 5, 1, 4]
[2, 7, 5, 8, 1, 4, 6, 3]
[2, 8, 6, 1, 3, 5, 7, 4]
[3, 1, 7, 5, 8, 2, 4, 6]
[3, 5, 2, 8, 1, 7, 4, 6]
[3, 5, 2, 8, 6, 4, 7, 1]
[3, 5, 7, 1, 4, 2, 8, 6]
[3, 5, 8, 4, 1, 7, 2, 6]
[3, 6, 2, 5, 8, 1, 7, 4]
[3, 6, 2, 7, 1, 4, 8, 5]
[3, 6, 2, 7, 5, 1, 8, 4]
[3, 6, 4, 1, 8, 5, 7, 2]


?-
n_queens(8, Qs), label(Qs), write(Qs), nl, fail.
Examples
History
Solutions
table results
Run!


[3, 7, 2, 8, 6, 4, 1, 5]
[3, 8, 4, 7, 1, 6, 2, 5]
[4, 1, 5, 8, 2, 7, 3, 6]
[4, 1, 5, 8, 6, 3, 7, 2]
[4, 2, 5, 8, 6, 1, 3, 7]
[4, 2, 7, 3, 6, 8, 1, 5]
[4, 2, 7, 3, 6, 8, 5, 1]
[4, 2, 7, 5, 1, 8, 6, 3]
[4, 2, 8, 5, 7, 1, 3, 6]
[4, 2, 8, 6, 1, 3, 5, 7]
[4, 6, 1, 5, 2, 8, 3, 7]
[4, 6, 8, 2, 7, 1, 3, 5]
[4, 6, 8, 3, 1, 7, 5, 2]
[4, 7, 1, 8, 5, 2, 6, 3]
[4, 7, 3, 8, 2, 5, 1, 6]
[4, 7, 5, 2, 6, 1, 3, 8]
[4, 7, 5, 3, 1, 6, 8, 2]
[4, 8, 1, 3, 6, 2, 7, 5]
[4, 8, 1, 5, 7, 2, 6, 3]
[4, 8, 5, 3, 1, 7, 2, 6]
[5, 1, 4, 6, 8, 2, 7, 3]
[5, 1, 8, 4, 2, 7, 3, 6]

[6, 3, 5, 8, 1, 4, 2, 7]
[6, 3, 7, 2, 4, 8, 1, 5]
[6, 3, 7, 2, 8, 5, 1, 4]
[6, 3, 7, 4, 1, 8, 2, 5]
[6, 4, 1, 5, 8, 2, 7, 3]
[6, 4, 2, 8, 5, 7, 1, 3]
[6, 4, 7, 1, 3, 5, 2, 8]
[6, 4, 7, 1, 8, 2, 5, 3]
[6, 8, 2, 4, 1, 7, 5, 3]
[7, 1, 3, 8, 6, 4, 2, 5]
[7, 2, 4, 1, 8, 5, 3, 6]
[7, 2, 6, 3, 1, 4, 8, 5]
[7, 3, 1, 6, 8, 5, 2, 4]
[7, 3, 8, 2, 5, 1, 6, 4]
[7, 4, 2, 5, 8, 1, 3, 6]
[7, 4, 2, 8, 6, 1, 3, 5]
[7, 5, 3, 1, 6, 8, 2, 4]
[8, 2, 4, 1, 7, 5, 3, 6]
[8, 2, 5, 3, 1, 7, 4, 6]
[8, 3, 1, 6, 2, 5, 7, 4]
[8, 4, 1, 3, 6, 2, 7, 5]
false