

EX.NO:1
Reg.no:220701022

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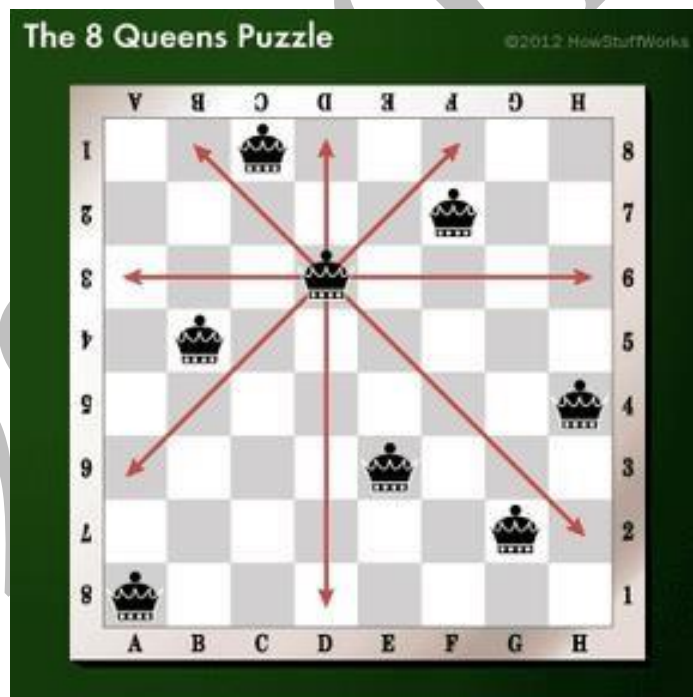
8-QUEENS PROBLEM

AIM:

To implement an 8-Queens problem using Python.

You are given an 8x8 board; find a way to place 8 queens such that no queen can attack any other queen on the chessboard. A queen can only be attacked if it lies on the same row, same column, or the same diagonal as any other queen. Print all the possible configurations.

To solve this problem, we will make use of the Backtracking algorithm. The backtracking algorithm, in general checks all possible configurations and test whether the required result is obtained or not. For the given problem, we will explore all possible positions the queens can be relatively placed at. The solution will be correct when the number of placed queens = 8.



CODE:

```
N = int(input("Enter the number of queens:"))
board = [[0] * N for _ in range(N)]

def is_safe(board, row, col):
    for i in range(col):
        if board[row][i] == 1:
            return False

    for i, j in zip(range(row, -1, -1), range(col, -1, -1)):
        if board[i][j] == 1:
            return False

    for i, j in zip(range(row, N, 1), range(col, -1, -1)):
        if board[i][j] == 1:
            return False

    return True

def solve_nqueens(board, col):
    if col >= N:
        return True

    for i in range(N):
        if is_safe(board, i, col):
            board[i][col] = 1

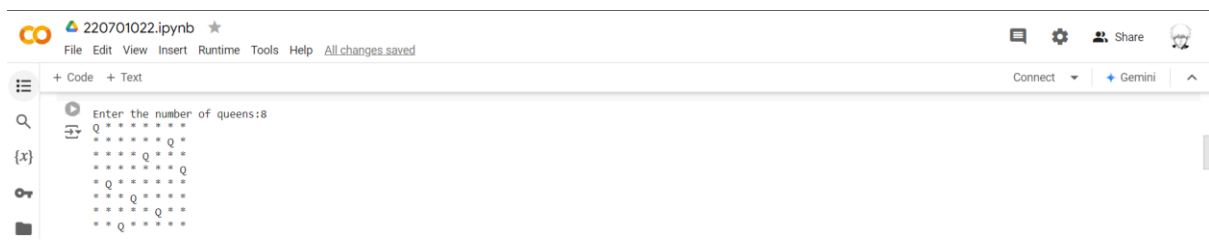
            if solve_nqueens(board, col + 1):
                return True

            board[i][col] = 0

    return False

if solve_nqueens(board, 0):
    for row in board:
        print(' '.join('Q' if x == 1 else '*' for x in row))
else:
    print("No solution exists")
```

OUTPUT:



The screenshot shows a Jupyter Notebook titled "220701022.ipynb". The interface includes a menu bar (File, Edit, View, Insert, Runtime, Tools, Help) and a toolbar with icons for Connect, Gemini, and Share. The notebook content consists of a code cell with the following text:

```
Enter the number of queens:8
Q * * * * *
* * * * * Q
* * * Q * *
* * * * * Q
* Q * * *
* * Q * *
* * * Q *
* Q * * *
```

The output displays an 8x8 chessboard with 'Q' representing queens. The queens are positioned at (1,1), (2,8), (3,6), (4,7), (5,2), (6,3), (7,4), and (8,5) assuming 0-indexing from the top-left. The board is surrounded by asterisks to indicate empty cells.

RESULT:

Thus, the 8-Queens program has been implemented successfully.