REG NO. 220701055

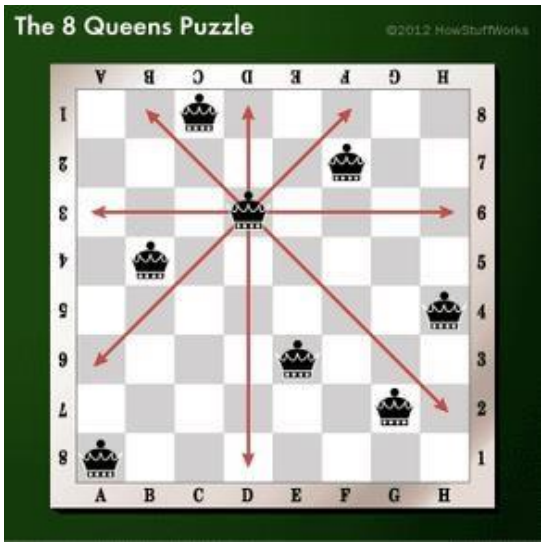
EX.NO: 3 **DATE:06.09.24**

8- QUEENS PROBLEM

AIM :

To implement an 8-Queesns 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:

```python
def print_board(board):
    for row in board:
        print(" ".join("Q" if col else "+" for col in row))
    print()

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

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

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

    return True

def solve_n_queens_util(board, row, N):
    if row >= N:
        return True

    for col in range(N):
        if is_safe(board, row, col, N):
            board[row][col] = True
            if solve_n_queens_util(board, row + 1, N):
                return True
            board[row][col] = False

    return False

def solve_n_queens(N):
    board = [[False] * N for _ in range(N)]

    if not solve_n_queens_util(board, 0, N):
        print("No solution exists")
    else:
        print_board(board)

def main():
    try:
        N = int(input("Enter the number of queens (N): "))
        if N <= 0:
            print("The number of queens must be a positive integer.")
        else:
            solve_n_queens(N)
    except ValueError:
        print("Invalid input. Please enter a positive integer.")

if __name__ == "__main__":
    main()
```

OUTPUT:

Enter the number of queens (N): 8

Q + + + + + + +

+ + + + Q + + +

+ + + + + + + Q

+ + + + + Q + +

+ + Q + + + + +

+ + + + + + Q +

+ Q + + + + + +

+ + + Q + + + +

RESULT: Thus 8 queens problem using python is executed successfully.