

EX.NO: 01

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REG.NO: 220701517

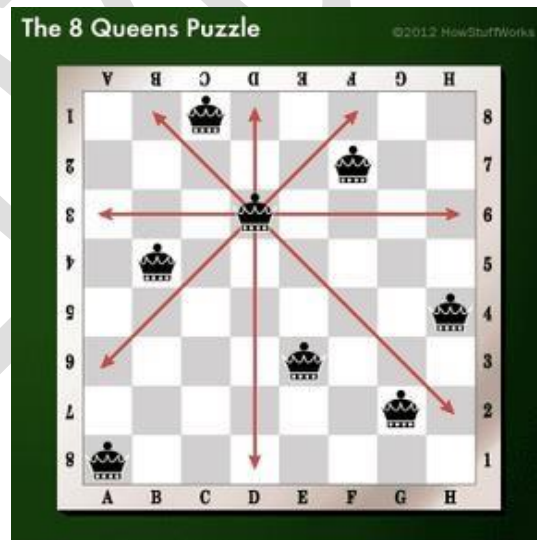
8- QUEENS PROBLEM

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:

```
def share_diagonal(x0, y0, x1, y1):
    ⚡ dx = abs(x0 - x1)
    dy = abs(y0 - y1)

    return dy == dx

def col_clashes(bs, c):
    for i in range(c):
        if share_diagonal(i, bs[i], c, bs[c]):
            return True

    return False

def has_clashes(the_board):
    for col in range(1, len(the_board)):
        if col_clashes(the_board, col):
            return True
    return False

def main():
    import random
    rng = random.Random()

    bd = list(range(8))
    num_found = 0
    tries = 0
    result = []
    while num_found < 10:
        rng.shuffle(bd)
        tries += 1

        if not has_clashes(bd) and bd not in result:
            print("Found solution {0} in {1} tries.".format(bd, tries))
            tries = 0
            num_found += 1
            result.append(list(bd))
    print(result)

main()
```

OUTPUT:

```
Found solution [2, 6, 1, 7, 5, 3, 0, 4] in 75 tries.  
Found solution [4, 2, 0, 6, 1, 7, 5, 3] in 738 tries.  
Found solution [3, 6, 2, 7, 1, 4, 0, 5] in 646 tries.  
Found solution [7, 3, 0, 2, 5, 1, 6, 4] in 473 tries.  
Found solution [5, 3, 6, 0, 7, 1, 4, 2] in 113 tries.  
Found solution [3, 0, 4, 7, 1, 6, 2, 5] in 481 tries.  
Found solution [4, 6, 1, 3, 7, 0, 2, 5] in 1227 tries.  
Found solution [5, 3, 1, 7, 4, 6, 0, 2] in 161 tries.  
Found solution [5, 3, 0, 4, 7, 1, 6, 2] in 117 tries.  
Found solution [5, 1, 6, 0, 3, 7, 4, 2] in 64 tries.  
[[2, 6, 1, 7, 5, 3, 0, 4], [4, 2, 0, 6, 1, 7, 5, 3], [3, 6, 2, 7, 1, 4, 0, 5],
```

RESULT:

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