3.N QUEEN PROBLEM

OBJECTIVE:

In chess, a queen can move as far as she pleases, horizontally, vertically, or diagonally. A chess board has 4 rows and 4 columns. The standard 4 by 4 Queen’s problem asks how to place 4 queens on an ordinary chess board so that none of them can hit any other in one move

ALGORITHM:

1. Place the queens column wise, start from the left most column

2. If all queens are placed.

1. return true and print the solution matrix.

3. Else

1.Try all the rows in the current column.

2.Check if queen can be placed here safely if yes mark the current cell in solution matrix as 1 and try to solve the rest of the problem recursively.

3.If placing the queen in above step leads to the solution return true.

4.If placing the queen in above step does not lead to the solution , BACKTRACK, mark the current cell in solution matrix as 0 and return false.

4. If all the rows are tried and nothing worked, return false and print NO SOLUTION.

INPUT

we need the no. of Queens placed in the Chess Board



OUTPUT:

Print the Board where the Queen is placed.



CODE:

#include<iostream>

using namespace std;

bool QueenisSafe(int a[][10],int i,int j, int n)

{

//check column

for(int row=0;row<i;row++)

{

if(a[row][j]==1)

{

return false;

}

}

//check left diagonal

int x=i;

int y=j;

while(x>=0 && y>=0)

{

if(a[x][y]==1)

{

return false;

}

x--;

y--;

}

//check right diagonal

x=i;

y=j;

while(x>=0 && y<n)

{

if(a[x][y]==1)

{

return false;

}

x++;

y++;

}

//position is now safe

return true;

}

bool SolveNQueen(int a[][10],int i,int n)

{

//base case

if(i==n)

{

// print the board

for(int i=0;i<n;i++)

{

for(int j=0;j<n;j++)

{

if(a[i][j]==1)

{

cout<<"Q";

}

else{

cout<<"\_";

}

}

cout<<endl;

}

return true;

}

//try to place the queen in the current row

for(int j=0;j<n;j++)

{

if( QueenisSafe(a,i,j,n))

{

a[i][j]=1;

bool nextqueen=SolveNQueen(a,i+1,n);

if(nextqueen){

return true;

}

}

// if assumption is wrong

a[i][j]=0; //backtrack

}

return false;

}

int main()

{

int n;

cout<<"Enter the no. of Queen= ";

cin>>n;

int a[10][10]={0};

SolveNQueen(a,0,n);

}