```java
package me.jamiepeterson.a110queens;

import java.util.LinkedList;
import java.util.Random;

public class Queens {

    //Board class (inner class)
    private class Board{

        private char[][] array;                 //2d Array is the board
        private int rows;                       //filled rows

        //Constructor
        private Board(int m, int n){
            array = new char[m][n];             //create array

            //initialize array to blanks
            for(int i = 0; i < m; i++)
                for(int j = 0; j < n; j++)
                    array[i][j] = ' ';

            rows = 0;
        }
    }

    private int m;
    private int n;

    //Queens Class Constructor
    public Queens(int m, int n){
        this.m = m;
        this.n = n;
    }

    //Solve Queens Problem
    public String solve(){
        LinkedList<Board> list = new LinkedList<Board>(); //List of boards
        LinkedList<Board> complete = new LinkedList<Board>(); //List of complete boards
        Random rand = new Random();             //RNG

        Board board = new Board(m,n);           //Create empty board
        list.addFirst(board);                   //Add to list

        while(!list.isEmpty()) {                //While list has boards
            board = list.removeFirst();         //Remove first board

            if(complete(board)) {               //If the board is a solution
                int choice = rand.nextInt(1);
                if(choice == 0)
                    complete.addFirst(board);
                else
                    complete.addLast(board);
```

```
54              }else{
55                  LinkedList<Board> children = generate(board);
56
57                  for(int i = 0; i < children.size(); i++)
58                      list.addFirst(children.get(i));
59              }
60          }
61          if(complete.isEmpty())
62              return "No Solution";       //Print if there is no solution
63          else
64              return display(complete.getFirst()); //Print one solution
65
66      }
67
68      //Method generates children of a board
69      private LinkedList<Board> generate(Board board){
70          LinkedList<Board> children = new LinkedList<Board>(); //Children list
71
72          for(int i = 0; i < m; i++){             //Generate children
73              Board child = copy(board);          //Create copy of parent
74              child.array[child.rows][i] = 'Q';   //Put queen in the row
75
76              if(check(child, child.rows, i))
77                  children.addLast(child);
78
79              child.rows ++;                      //Increment Filled Rows
80          }
81          return children;                        //Return List of children
82      }
83
84      //Method checks whether queen at a given location causes conflict
85      private boolean check(Board board, int x, int y){
86          for(int i = 0; i < m; i ++)             //Go thru all locations
87              for(int j = 0; j < n; j++){
88                  if(board.array[i][j] == ' ');   //If empty ignore
89                  else if(x == i && y == j);      //If same location ignore
90                  else if(x == i || y == j || x+y == i+j || x-y == i-j)
91                      return false;               //Conflict if in same row, column
    , or diagonal
92              }
93          return true;                            //No conflicts
94      }
95
96      //Method makes copy of board
97      private Board copy(Board board){
98          Board result = new Board(m,n);          //Empty board
99
100         for(int i = 0; i < m; i++)              //Copy given board to empty board
101             for(int j = 0; j < n; j++)
102                 result.array[i][j] = board.array[i][j];
103
104         result.rows = board.rows;               //Copy filled rows
105
106         return result;                          //Return copy
```

```
107     }
108
109     //Checks if board is complete
110     private Boolean complete(Board board){
111         return(board.rows == m);                //Check number filled rows equals
    board size
112     }
113
114     //Displays board
115     private String display(Board board){
116         String displayBoard = "-";
117
118         for(int j = 0; j < n; j++)              //Top horizontal line
119             displayBoard = displayBoard + "--";
120
121         displayBoard = displayBoard + "\n";
122
123         for(int i = 0; i < m; i++){             //Every row
124             displayBoard = displayBoard + "|";  //First Line
125             for(int j = 0; j < n; j++)          //Slots
126                 displayBoard = displayBoard +board.array[i][j]+ "|";
127
128             displayBoard = displayBoard + "\n";  //Next Line
129
130             displayBoard = displayBoard + "-";
131             for(int j = 0; j < n; j++)          //Horizontal line
132                 displayBoard = displayBoard + "--";
133
134             displayBoard = displayBoard + "\n";     //Next Line
135
136         }
137         return displayBoard; //return
138     }
139 }
```