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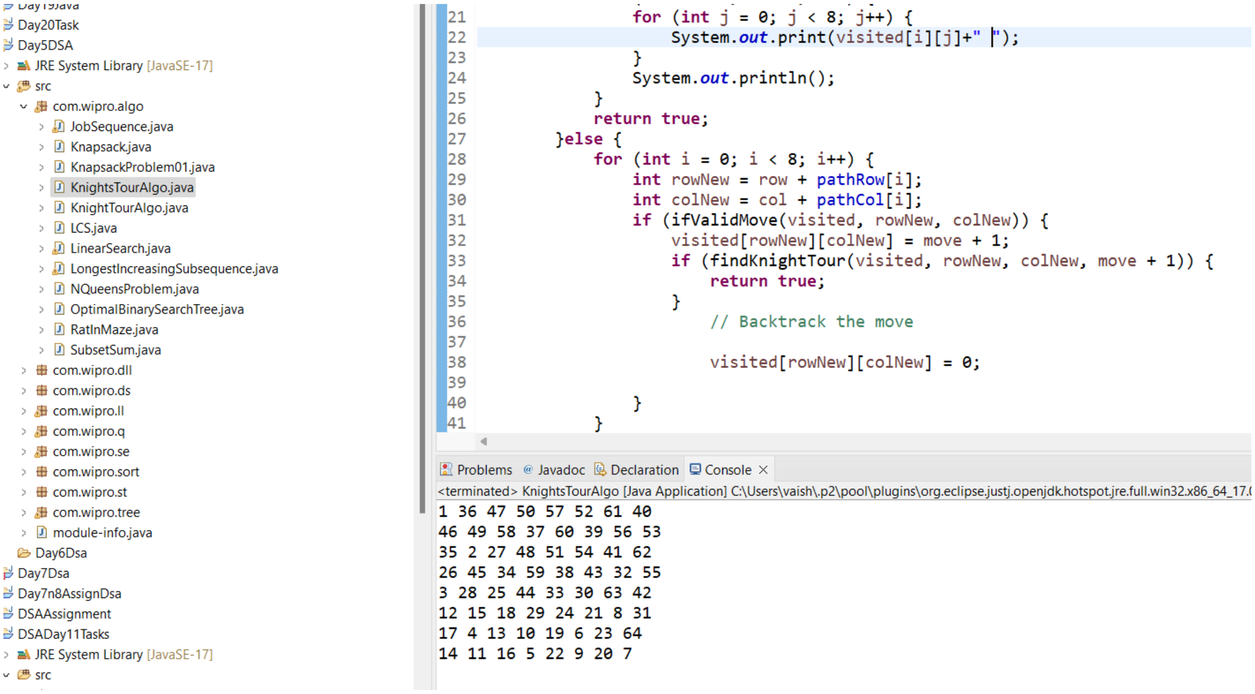
Day 16 and 17:

Task 1: The Knight’s Tour Problem Create a function bool SolveKnightsTour(int[,] board, int moveX, int moveY, int moveCount, int[] xMove, int[] yMove) that attempts to solve the Knight's Tour problem using backtracking. The function should return true if a solution exists and false otherwise. The board represents the chessboard, moveX and moveY are the current coordinates of the knight, moveCount is the current move count, and xMove[], yMove[] are the possible next moves for the knight. Fill the chessboard such that the knight visits every square exactly once. Keep the chessboard size to 8x8.

```java
package com.wipro.algo;

public class KnightsTourAlgo {
    // Possible moves of a Knight
    int[] pathRow = { 2, 2, 1, 1, -1, -1, -2, -2 };
    int[] pathCol = { -1, 1, -2, 2, -2, 2, -1, 1 };

    public static void main(String[] args) {
        KnightsTourAlgo knightTour = new KnightsTourAlgo();
        int[][] visited = new int[8][8];
        visited[0][0] = 1;

        if (!(knightTour.findKnightTour(visited, 0, 0, 1))) {
            System.out.println("Soultion Not Available :(");
        }
    }

    private boolean findKnightTour(int[][] visited, int row, int col,
int move) {
        if (move == 64) {
            for (int i = 0; i < 8; i++) {
                for (int j = 0; j < 8; j++) {
                    System.out.print(visited[i][j]+" ");
                }
                System.out.println();
            }
            return true;
        }else {
            for (int i = 0; i < 8; i++) {
                int rowNew = row + pathRow[i];
                int colNew = col + pathCol[i];
                if (ifValidMove(visited, rowNew, colNew)) {
                    visited[rowNew][colNew] = move + 1;
                    if (findKnightTour(visited, rowNew, colNew,
move + 1)) {
                        return true;
                    }
                        // Backtrack the move

                        visited[rowNew][colNew] = 0;

                }
            }
        }

        return false;
    }

    private boolean ifValidMove(int[][] visited, int rowNew, int
colNew) {
        if(rowNew >=0 && rowNew <8 && colNew >=0 && colNew<8 &&
visited[rowNew][colNew] ==0)
        {
            return true;
        }
        return false;
    }



}
```



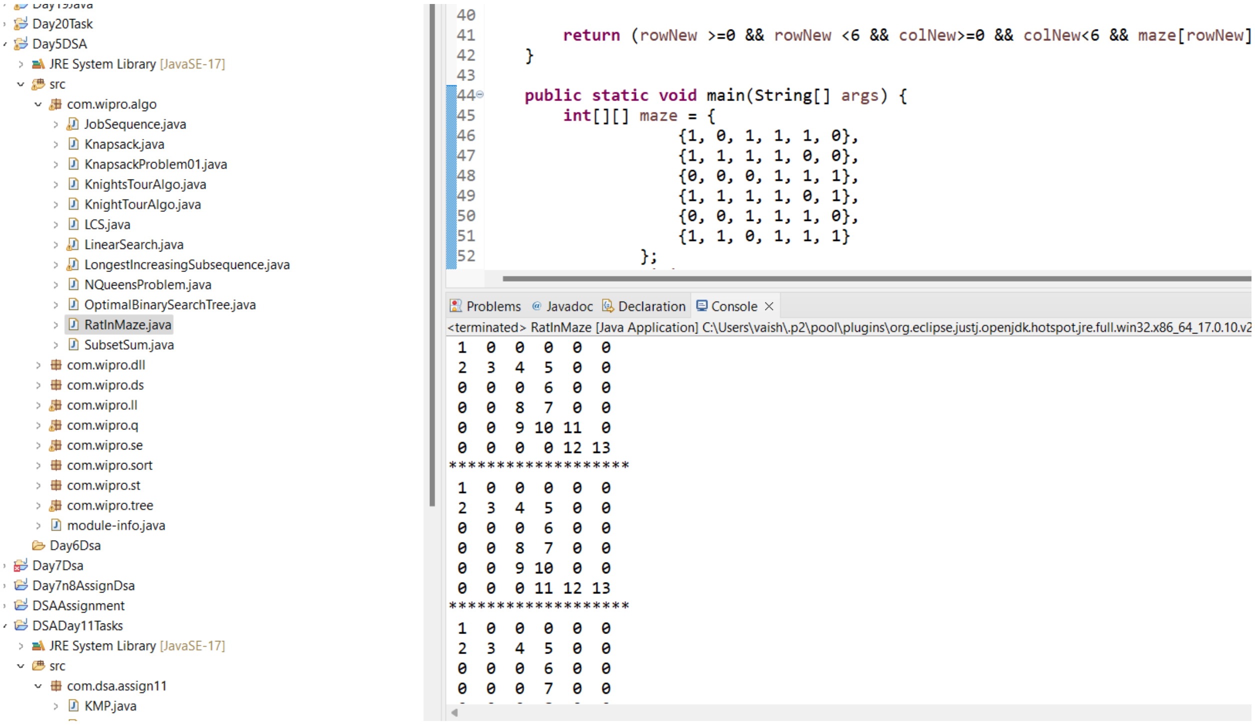
```java
                for (int j = 0; j < 8; j++) {
                    System.out.print(visited[i][j]+" ");
                }
                System.out.println();
            }
            return true;
        }else {
            for (int i = 0; i < 8; i++) {
                int rowNew = row + pathRow[i];
                int colNew = col + pathCol[i];
                if (ifValidMove(visited, rowNew, colNew)) {
                    visited[rowNew][colNew] = move + 1;
                    if (findKnightTour(visited, rowNew, colNew, move + 1)) {
                        return true;
                    }
                        // Backtrack the move

                        visited[rowNew][colNew] = 0;

                }
            }
```

```
<terminated> KnightsTourAlgo [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.(
1 36 47 50 57 52 61 40
46 49 58 37 60 39 56 53
35 2 27 48 51 54 41 62
26 45 34 59 38 43 32 55
3 28 25 44 33 30 63 42
12 15 18 29 24 21 8 31
17 4 13 10 19 6 23 64
14 11 16 5 22 9 20 7
```

Task 2: Rat in a Maze mplement a function bool SolveMaze(int[,] maze) that uses backtracking to find a path from the top left corner to the bottom right corner of a maze. The maze is represented by a 2D array where 1s are paths and 0s are walls. Find a rat's path through the maze. The maze size is 6x6.

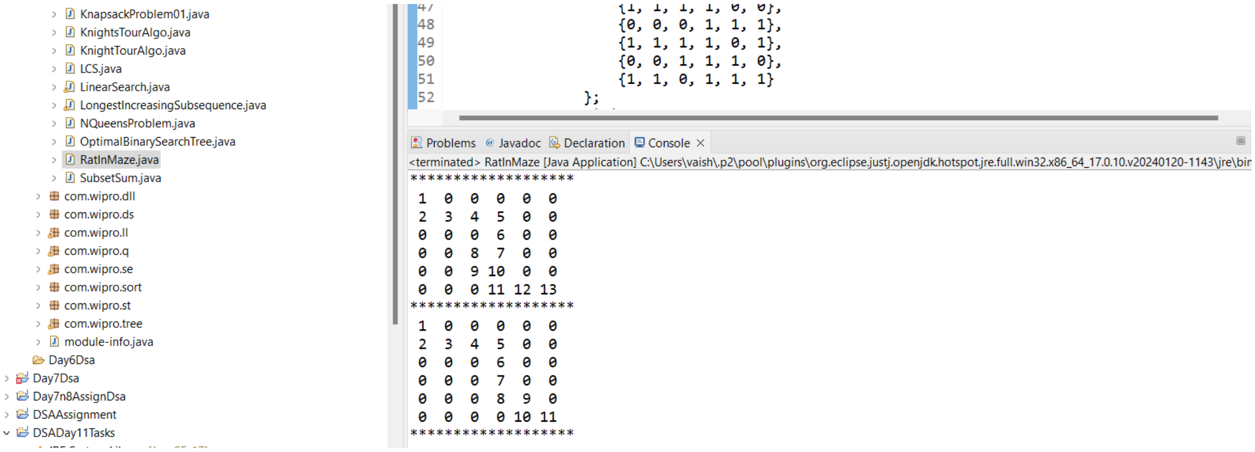
```java
package com.wipro.algo;



public class RatInMaze {
	int[] pathRow = { 0 , 0 , 1 ,-1};
	int[] pathCol = {  1, -1, 0, 0};


	private void findPathInMaze(int[][] maze, int[][] visited, int
row, int col, int destRow, int destCol, int move) {
		if (row == destRow && col ==destCol) {
			for (int i = 0; i < 6; i++) {
				for (int j = 0; j < 6; j++) {
					System.out.printf("%2d ",visited[i][j]);
				}
				System.out.println();
			}
			System.out.println("*******************");
		} else {
			for (int index = 0; index < pathRow.length; index++) {
```

```
                int rowNew = row + pathRow[index];
                int colNew = col + pathCol[index];

                if(isValidMove(maze,visited, rowNew,colNew)) {

                    move++;
                    visited[rowNew][colNew] =move;
                    findPathInMaze(maze,visited, rowNew,colNew,
destRow,destCol, move);

                    move--;
                    visited[rowNew][colNew]=0;

                }
            }
        }

    }

    private boolean isValidMove(int[][] maze, int[][] visited, int
rowNew, int colNew) {

        return (rowNew >=0 && rowNew <6 && colNew>=0 && colNew<6 &&
maze[rowNew][colNew] ==1 && visited[rowNew][colNew] == 0);
    }

    public static void main(String[] args) {
        int[][] maze = {
                   {1, 0, 1, 1, 1, 0},
                 {1, 1, 1, 1, 0, 0},
                 {0, 0, 0, 1, 1, 1},
                 {1, 1, 1, 1, 0, 1},
                 {0, 0, 1, 1, 1, 0},
                 {1, 1, 0, 1, 1, 1}
              };
        int[][] visited = new int[6][6];
        visited[0][0] = 1;

        RatInMaze ratInMaze = new RatInMaze();
         ratInMaze.findPathInMaze(maze, visited, 0, 0, 5, 5, 1);

    }
}
```



```

        return (rowNew >=0 && rowNew <6 && colNew>=0 && colNew<6 && maze[rowNew]
    }

    public static void main(String[] args) {
        int[][] maze = {
                    {1, 0, 1, 1, 1, 0},
                    {1, 1, 1, 1, 0, 0},
                    {0, 0, 0, 1, 1, 1},
                    {1, 1, 1, 1, 0, 1},
                    {0, 0, 1, 1, 1, 0},
                    {1, 1, 0, 1, 1, 1}
                };
```

```
<terminated> RatInMaze [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v2
 1  0  0  0  0  0
 2  3  4  5  0  0
 0  0  0  6  0  0
 0  0  8  7  0  0
 0  0  9 10 11  0
 0  0  0  0 12 13
******************
 1  0  0  0  0  0
 2  3  4  5  0  0
 0  0  0  6  0  0
 0  0  8  7  0  0
 0  0  9 10  0  0
 0  0  0 11 12 13
******************
 1  0  0  0  0  0
 2  3  4  5  0  0
 0  0  0  6  0  0
 0  0  0  7  0  0
```



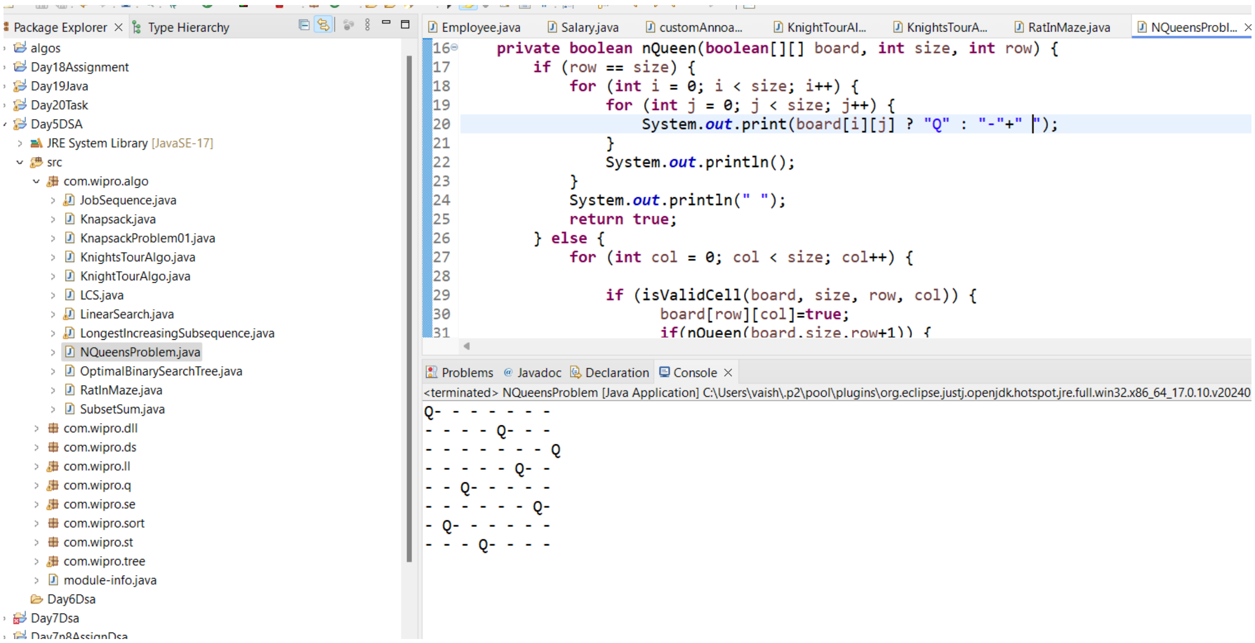
```
                    {1, 1, 1, 1, 0, 0},
                    {0, 0, 0, 1, 1, 1},
                    {1, 1, 1, 1, 0, 1},
                    {0, 0, 1, 1, 1, 0},
                    {1, 1, 0, 1, 1, 1}
                };
```

```
<terminated> RatInMaze [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin
******************
 1  0  0  0  0  0
 2  3  4  5  0  0
 0  0  0  6  0  0
 0  0  8  7  0  0
 0  0  9 10  0  0
 0  0  0 11 12 13
******************
 1  0  0  0  0  0
 2  3  4  5  0  0
 0  0  0  6  0  0
 0  0  0  7  0  0
 0  0  0  8  9  0
 0  0  0  0 10 11
******************
```

Task 3: N Queen Problem Write a function bool SolveNQueen(int[,] board, int col) in C# that places N queens on an N x N chessboard so that no two queens attack each other using backtracking. Place N queens on the board such that no two queens can attack each other. Use a standard 8x8 chessboard.

```
package com.wipro.algo;

public class NQueensProblem {

	public static void main(String[] args) {
		int size = 8;
		boolean[][] board = new boolean[size][size];
```

```java
        NQueensProblem nQueensProblem = new NQueensProblem();
        if (!nQueensProblem.nQueen(board, size, 0)) {
            System.out.println("No solution found :( ");
        }

    }

    private boolean nQueen(boolean[][] board, int size, int row) {
        if (row == size) {
            for (int i = 0; i < size; i++) {
                for (int j = 0; j < size; j++) {
                    System.out.print(board[i][j] ? "Q" : "-"+"
");

                }
                System.out.println();
            }
            System.out.println(" ");
            return true;
        } else {
            for (int col = 0; col < size; col++) {

                if (isValidCell(board, size, row, col)) {
                board[row][col]=true;
                if(nQueen(board,size,row+1)) {
                return true;
                }
                board[row][col]=false;

                }
            }

        }

        return false;
    }

    private boolean isValidCell(boolean[][] board, int size, int row,
int col) {
        // check column
        for (int i = 0; i < row; i++) {
            if (board[i][col]) {
                return false;
            }
        }
        // check upper left diagonal
        for (int i = row, j = col; i >= 0 && j >= 0; i--, j--) {
            if (board[i][j]) {
                return false;
            }
        }

        // check upper right diagonal
        for (int i = row, j = col; i >= 0 && j <size; i--, j++) {
            if (board[i][j]) {
                return false;
            }
        }
        return true;
    }

}
```



```java
    private boolean nQueen(boolean[][] board, int size, int row) {
        if (row == size) {
            for (int i = 0; i < size; i++) {
                for (int j = 0; j < size; j++) {
                    System.out.print(board[i][j] ? "Q" : "-"+" ");
                }
                System.out.println();
            }
            System.out.println(" ");
            return true;
        } else {
            for (int col = 0; col < size; col++) {

                if (isValidCell(board, size, row, col)) {
                    board[row][col]=true;
                    if(nQueen(board,size,row+1)) {
```

```
<terminated> NQueensProblem [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240
Q- - - - - - -
- - - - Q- - -
- - - - - - - Q
- - - - - Q- -
- - Q- - - - -
- - - - - - Q-
- Q- - - - - -
- - - Q- - - -
```