

Objective

To design and implement a recursive algorithm

Overview

This assignment is based on Programming Project 13.4 on page 626 of the text. The maze is described in a text file. The first line of the file gives the number of rows and number of columns of the 2-D grid that forms the maze. The following lines each describe one row of the maze by giving the indexes of the blocked squares in that row. A final line gives the start position. In the following illustration, # designates a blocked square:

<u>Maze Data File</u>	<u>Implementation in Memory</u>	<u>Description</u>
9 9		9 rows, 9 columns
1 3 4 5 6 7 8 9	# # # # # # # #	
1 7 9	# # # # # # # #	
1 3 4 5 6 7 9	# # # # # # # #	
1 3 5 9	# # # # # # # #	
1 3 5 6 7 9	# # + # # # # #	
1 5 9	# # # # # # # #	
1 2 3 5 7 9	# # # # # # # #	
1 7 9	# # # # # # # #	
1 2 3 4 5 6 7 9	# # # # # # # #	
5 4		Start (5.4)

Specific Requirements

1. Complete the class *Position* to represent a pair of (*row*, *column*) coordinates. Provide a constructor and accessors; override *toString()* and *equals()*; implement the methods *isAdjacentTo()* and *neighbors()*. **NB: This class is not Maze-specific.**
2. Complete the class *Path* to represent a sequence of *Positions* of orthogonally adjacent squares describing a path through a maze. Stubs of required methods are provided.
3. Complete the class *Grid* to represent a physical maze; it is implemented as a 2D array of *Square* elements.
4. The *enum* type *Square* represents the (state of the) squares in the grid.
  - Initially, every square of the grid is either OPEN or BLOCKED
  - The state of a square changes to SELECTED if it is added to the path
  - The state of a square changes to REJECTED if it is removed from the path.
5. Complete class *Maze*. The method *solve()* must be recursive;
  - *solve()* returns *true* when it finds a path ending at any OPEN border square
  - *solve()* returns *false* when it determines that there is no escape path.

**Hint:** What are your base cases?
6. A client is provided.

Submitting Your Assignment

Upload your zipped source files in SCIS Moodle: <https://moodle.cis.fiu.edu/> on or before the due date. **SCIS Moodle will not allow late submissions.**