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Project 4

Files:

- buildMaze.cpp
- DisjSets.cpp
- DisjSets.h
- Maze.cpp
- Maze.h
- mazeCell.h

Summary:

The main goal of this project was to be able to ask the user for the number of columns and rows that they would like for a randomly generated maze. The program would also ask if the user would like to see every iteration of the creation of the maze. It was implemented using two main objects: a maze class and a disjoint sets class. The maze class was used to keep track of the maze itself, and to output the maze as it was created. This used a vector of mazeCell type. MazeCell was another class that held four boolean variables to tell whether there was a wall to the left, right, top, and bottom of that specific cell. The way that we knew whether the maze could be completed was by using the disjoint set class, which contained a vector of ints that was used to keep track of the disjoint set. The processes for generating random numbers, checking to see if they are neighbors in the maze, and making sure they are not connected would all loop until the top left cell connected to the bottom right cell.The main issues that I ran into were in the logic of making sure that the cells were neighbors. I had originally forgotten to account for the cells that would be to the left or right of each other in a vector, but were actually on different lines, and for one instance of that I even was looking at the wrong variable. Once those logical errors were sorted out, most of the other parts went smoothly.

What does it mean for two cells to "be connected" with respect to this maze?

We would have a hard time knowing if two cells were connected from just using the maze class, since we would have to traverse every possible option from where there were not walls. In this project, we used the disjSets class to make this much easier, since was can tell if two nodes are connected by seeing if they belong to the same root. This means that we just have to find the root of each of the two cells and compare the roots to see if they are the same. If they have the same root, they are in the same set, and therefore are connected in the maze. If they do not have the same root, then they are not in the same set and therefore they are not connected.