

Project Title: Percolation Simulation using Connected Components

Project Description:

In this project, you will model a percolation system using an n -by- n grid of sites. Each site in the grid is either open or blocked. A site is considered *full* if it is open and connected (via its neighboring sites: left, right, up, or down) to an open site in the top row. The system is said to percolate if there is at least one full site in the bottom row—meaning that filling open sites connected to the top row eventually leads to filling a site on the bottom row.

In addition to the percolation simulation, you are required to implement the Connected Components (CC) algorithm. You can choose either Depth-First Search (DFS) or Breadth-First Search (BFS) to identify and label connected clusters of open sites. Once your CC algorithm is implemented, you will apply it to solve the percolation problem by determining whether a connected component exists that spans from the top row to the bottom row.

Input:

- The first line of input denotes the size of the grid (N).
- Each subsequent line provides the indices of a grid cell that is open.

Output:

- Print `true` if the grid percolates (i.e., if there is a connected component linking the top row to the bottom row); otherwise, print `false`.

Note:

- Index values for the grid range from 1 to N (inclusive).