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Assignment 3:

Description:
This python file contains the Breadth First Search implementation to solve the 15 Puzzle. The implementation is done in a generic way so that the program can solve any square matrix puzzle, but implementation assumes there is a '0' input in the matrix. This implementation also makes the assumption that the empty tile in the goal state is always at the end of the matrix (at [3, 3] in the case of 4x4 matrix puzzle).

The program implementation consists of two classes, one **PuzzleNode** class to store the state, action, parent and empty tile position. Another **PuzzleSolver** class to implement the Breadth first search part, check the goal state and compute the child nodes. The **PuzzleSolver** class keeps track of expanded nodes in **explored_set** and nodes to be expanded in a **frontier** list. When the desired goal state is found, the list moves to be exeeceuted is found by backtracking from the goal state node to the root node.

Instructions to run the code:
This code is compiled and executed on python3 with **Python 3.8.10** version. This code uses tracemalloc to track the memory usage which is not present in python2 which could lead to an error.

The program can be run with the command **python3 650208577_AI_assignment_3.py** from the command line and the user will be prompted to enter the initial state input and upon entering a square matrix, the program results in the actions taken, number of nodes expanded, time and memory usage for the execution.

Sample run: