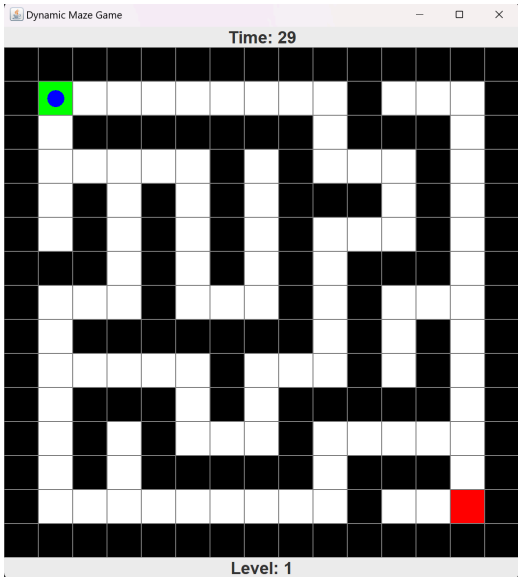
Dynamic Maze Game Documentation

1. What is the Game?



The **Dynamic Maze Game** is an interactive puzzle game that involves navigating a player through a maze. The goal is to reach the exit within a time limit, with the maze becoming progressively more difficult as the player advances through the levels. Each level features a new, randomly generated maze, with increasing size and decreasing time limits.

2. How to Play the Game?

1. **Start the Game**: When you launch the game, a maze will appear with a timer and level indicator at the top.
2. **Navigate the Maze**: Use the W, A, S, D keys to move the player up, left, down, or right. The player can only move one tile at a time.
3. **Reach the Exit**: The goal is to navigate through the maze and reach the exit within the time limit. The maze's exit is always located at the bottom-right corner.
4. **Level Progression**: Once you reach the exit, you will advance to the next level, which will feature a larger maze and a shorter time limit. Continue progressing through increasingly difficult levels until you complete all levels.
5. **Game Over**: If the timer runs out before reaching the exit, the game will end, and you will be prompted with a "Game Over" message.

Controls:

- **W**: Move up.
- **S**: Move down.
- **A**: Move left.
- **D**: Move right.

3. How Did I Make It?

Technologies Used:

- **Java**: The game was built using the Java programming language, specifically using the Swing framework for the graphical user interface (GUI).
- **Swing**: Swing provides the tools to create the interactive interface, including the maze grid, player controls, and game timer.
- **Graphics**: The maze is drawn on the screen using basic graphics elements in Java, with dynamic tile sizing for responsiveness based on the window's size.

Key Components:

- **Maze Generation**: The maze is generated dynamically using an algorithm that creates random mazes with a start point, exit, and walls.
- **Player Movement**: The player's position is tracked, and their movement is restricted by the walls of the maze. The movement is updated when the user presses the arrow keys (W, A, S, D).
- **Timer**: A countdown timer is implemented to add urgency to the gameplay, decreasing with each level. If the timer reaches zero, the game ends.
- **Level Progression**: Upon completing a level, the game generates a new maze with increased size and a shorter time limit. The level counter is updated accordingly.
- **Dynamic Tile Size**: The game window automatically adjusts the tile size to fit the window's dimensions, ensuring the maze is always displayed correctly regardless of the window's size.

4. What Were the Challenges?

While developing the game, several challenges were encountered:

1. Maze Generation:

- Generating random mazes that were solvable, dynamic, and scalable for each level was tricky. The algorithm had to ensure that there was always a valid path from the start to the exit.

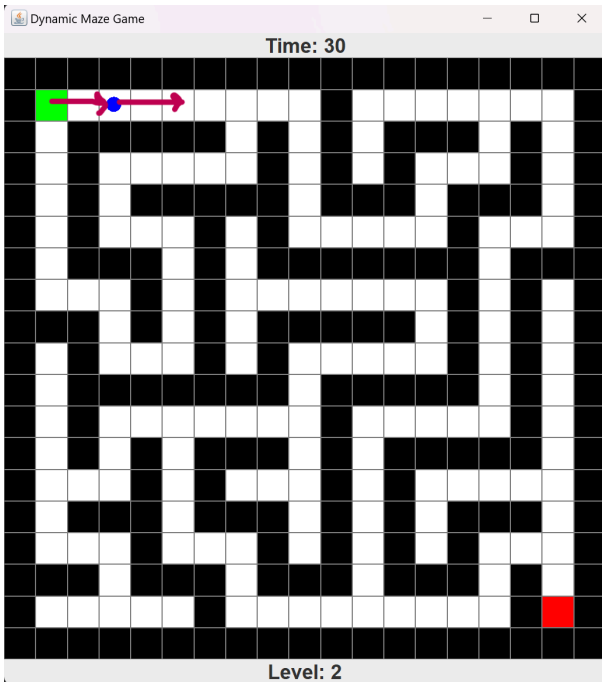
2. Dynamic Tile Size:

- One of the challenges was ensuring the maze tiles adjusted correctly to fit within the window size while maintaining their shape. The tile size needed to be recalculated dynamically based on the number of rows and columns in the maze and the window size.

3. Keyboard Input:

- Managing real-time keyboard input for player movement while ensuring that movement is smooth and restricted to valid paths (not moving through walls) required real-time checks.

5. What Bugs Still Exist?



1. Tile Size Bug:

- A significant issue is with the tile size calculation, particularly when resizing the window. The tile size is based on the window's dimensions, and while this works well in the first level, when transitioning between levels with different maze sizes, the tile size does not adjust properly, causing the span of the step to increase proportionally to the level. This bug impacts the game's responsiveness and graphical integrity.

(two steps per key press in level 2)

6. Future Improvements

- **Fixing Tile Size Calculation**: Addressing the dynamic tile size bug is a priority, ensuring that the tiles always fit correctly within the window and are consistently scaled when transitioning between levels.
- **Sound and Graphics**: Adding background music and sound effects would improve the overall player experience.
- **Multiplayer Functionality**: Introducing multiplayer functionality where two or more players can simultaneously navigate the maze in real time. This feature would allow players to compete or collaborate to reach the exit first.