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PROJECT SPECIFICATION

The company Discre has requested your services as a developer to create a unique and engaging game called "Froggish." Froggish is a graph-based game designed to entertain and challenge players while also introducing them to fundamental graph data structures and algorithms like BFS, DFS, and Dijkstra's algorithm. The game aims to provide an enjoyable experience that combines fun and learning.

Purpose of the Game

Froggish is an adventure game where players take on the role of a cute and determined frog on a quest to find its way home. The objective is to guide the frog, who got lost, to get back to his home by helping him hop on water lily leafs.

Game Overview

Levels

Froggish is divided into three distinct levels, each presenting a unique challenge for the player:

- Plant Pot (Level 1): In the first level, the frog starts its journey in a cozy plant pot filled with lotus flowers and leaves. The player's task is to guide the frog through a minimum of 15 jumps to reach a magical portal. The plant pot serves as the warm-up level with equal numbers of leaves and lotus flowers.

- River (Level 2): Upon passing through the portal in Level 1, the frog arrives at a river. In this level, the frog encounters a landscape with more leaves than lotus flowers. To reach the second portal and progress to the next level, the frog must complete at least 20 jumps.

- Garden (Level 3): The final destination of the frog's journey is its beautiful garden home. Here, the frog has to make the final 15 jumps to reach its home. This level contains only two lotus flowers - one at the starting point and one at the home location.

Energy Mechanism

- Leaves: Jumping on leaves consumes energy, with each leaf having a random energy cost ranging from 1 to 5. Players must make decisions on which leaves to jump on to minimize energy consumption.

- Lotus Flowers: Landing on lotus flowers replenishes the frog's energy, with each lotus providing a random amount of energy.

Hints

Players are provided with the option to seek hints during their journey. Hints show the best path to navigate through the level, helping players make informed decisions. Hints come at a cost, with the energy expenditure increasing with each level: 3 energy in Level 1, 5 energy in Level 2, and 7 energy in Level 3.

Objective

The ultimate goal in Froggish is to guide the frog through the graph of nodes, spanning from the starting lotus flower to the frog's home. This journey must be accomplished in a limited number of jumps. The player must manage the frog's energy wisely, considering the varying costs of leaves and the rewards of lotus flowers.

Technical Requirements

To develop Froggish according to Discre's requirements, the following technical specifications must be met:

- Graphic Interface: The game must be implemented using JavaFX, providing an engaging and user-friendly graphical interface for players.

- Graph Data Structure: The game must incorporate a graph data structure to represent the interconnected nodes that define the levels. These nodes will correspond to the positions of leaves, lotus flowers, and portals.

- Graph Algorithms: Implement BFS, DFS, and Dijkstra's algorithm within the game to compute optimal paths, assist with hint generation, and challenge players with graph-related puzzles.

Froggish is not only a source of entertainment but also an educational tool that introduces players to fundamental graph data structures and algorithms. By skillfully navigating the frog through different levels while optimizing energy consumption, players will gain a deeper understanding of these concepts in an enjoyable gaming experience. Discre believes that Froggish has the potential to offer an exciting and educational gaming experience to a wide audience.