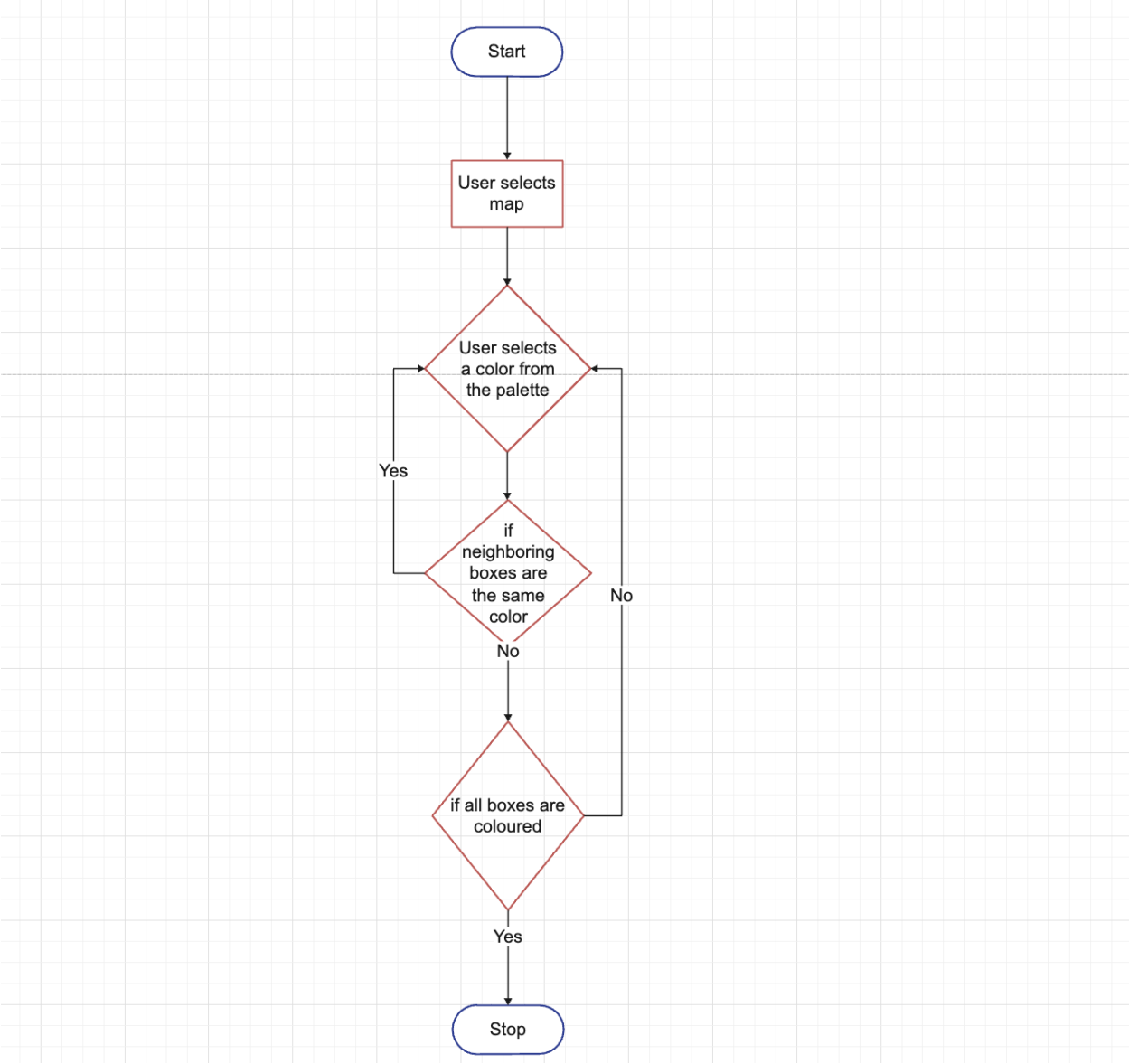
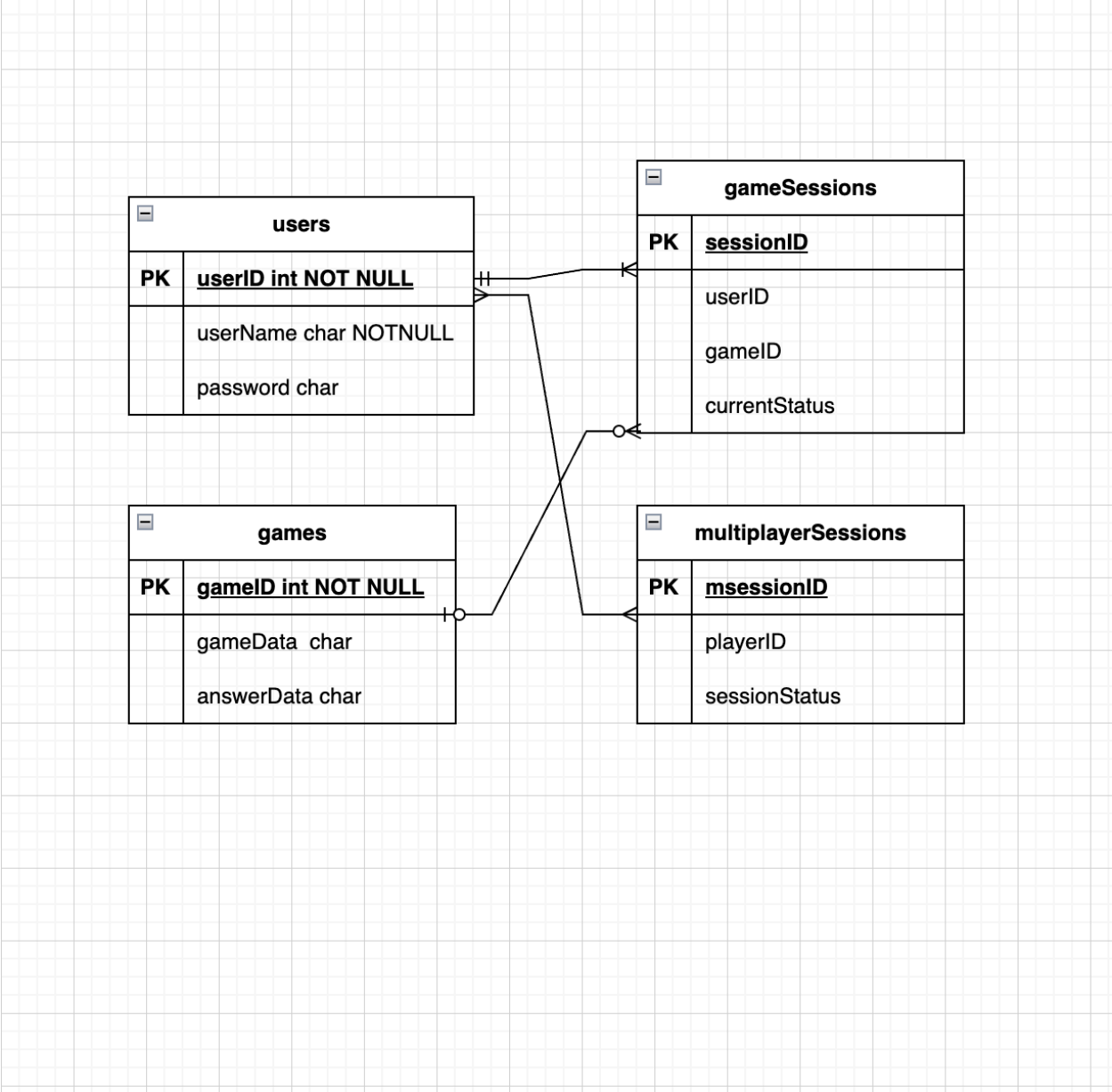
Design Specific Document

1. **Project Description:** The Color Mapping project is an online gaming platform where users can engage in creatively coloring various shapes on a grid, adhering to specific rules concerning color selection, namely that neighboring boxes must have different colors. Access to the game requires users to log in or register. The main objective is to offer an immersive and stimulating experience suitable for players of all ages.

   Flow chart:



ERD Diagram:



2. **Methods used:**
   a) A simple method for solving the puzzle could be a greedy algorithm:

   Start with an empty grid.
   Iterate over each box in the grid.
   For each box, check the colors of its neighboring boxes.
   Color the current box with the first available color not used by its neighbors.
   Repeat until all boxes are colored.

b) Another approach is back propagation:
The algorithm selects an uncolored region and tries all available colors for that region. If a color is valid it's assigned to the current region, and the function recursively calls itself. If the recursive call returns true, indicating that the map is successfully colored, the algorithm returns true. If no valid coloring solution is found for the current region and color, the algorithm backtracks by undoing the color assignment and continues trying other colors or regions. If no valid coloring solution is found for the entire map, the algorithm returns false.

c) selectColor(): for coloring the box
d) changeMap(): for displaying the next map
e) startGame() and stopGame(): for starting and stopping the game
f) saveSession(): stores session for each step

3. Market space and selling points:

a) Creativity: Allows users to express their creativity by coloring different shapes on a grid.
b) Challenge: Provides a challenge by requiring users to follow specific rules related to color selection.
c) Variety: Offers dynamically changing maps with varying shapes and sizes, enhancing the diversity of the coloring experience.
d) Engagement: Features game controls and map selection to ensure continuous engagement.

4. Product features:

a) Dynamic Mapping: Provides dynamically changing maps with varying shapes and sizes.
b) Color Palette: Offers a palette of colors for users to choose from.
c) Map Selection: Allows users to choose from a selection of predefined maps, each with its unique layout and challenge.
d) Rule Enforcement: Ensures that neighboring boxes are not colored the same.
e) User Progress Tracking: Tracks user progress and saves it for future sessions.
f) Leaderboards: Displays high scores and achievements to encourage competition among players.

5. Deployment:

a) Once the flask project is done, set up Heroku by logging in, creating a new app, and linking it to the Git repository.
b) Add the PostgreSQL add-on to the Heroku app for database support.
c) Configure any necessary environment variables for the app, such as database connection strings.

d) Deploy the Flask application to Heroku by pushing the code to Heroku's remote repository using Git.

6. **Milestones:**
   a) M1 (Setup and Initial Design): Establish project structure, design database schema, and set up basic Flask and React applications.
   b) M2 (Main Algorithm): Implement the coloring logic with UI.
   c) M3 (User Progress): Store user progress, multiplayer support, account management, and leaderboard.
   d) M4 (Multiplayer Scoreboard): Implement multiplayer support.
   e) M4 (Testing and Deployment): testing and deploying the project.