General Report on Tile Management and Data Structures in Okey Game

1. Operations in Adding and Removing Tiles

During gameplay, tiles are dynamically added and removed from the board. These operations are implemented as follows:

- **Adding Tiles:**
  - Tiles are added using the `addKey` method in the **OkeyBoard** class.
  - Tiles are stored in a dynamic collection such as an **ArrayList**.
  - **Checks:**
    - If the board exceeds the limit of 14 tiles, an `IllegalStateException` is raised.
- **Removing Tiles:**
  - Tiles are removed using the `removeKey` method.
  - The specific tile is removed from the collection.
  - **Checks:**
    - If the tile does not exist on the board, an `IllegalArgumentException` is raised.

2. Determining a Player's Completion of the Game

To verify if a player has completed the game, the following checks are performed:

- **Grouping Tiles into Blocks:**
  - Tiles must form valid blocks such as:
    - Consecutive numbers of the same color (e.g., 2-3-4).
    - The same number in different colors (e.g., red 11, blue 11, yellow 11).
  - **Validation Steps:**
    - Sort tiles by color and number.
    - Check consecutive tiles for valid block formation.
    - Ensure all tiles belong to at least one block.
- **Seven Pairs Check:**
  - Verify if the player has seven pairs of tiles of the same number and color.
  - **Validation Steps:**
    - Group tiles by number and color.
    - Check if each group contains pairs.
- **Joker and Fake Joker Handling:**
  - **Joker Tiles:** Can replace any tile to form valid blocks.
  - **Fake Joker Tiles:** Neutralize joker functionality, affecting block validation.

3. Preferred Data Structures for Tile Management

To efficiently manage the dynamic nature of tile operations and validations, certain data structures are preferred:

- **Dynamic Block Management:**
  - Use multi-dimensional arrays or linked lists to represent blocks.

- o Examples:
  - ▪ A list for consecutive numbers of the same color (e.g., red 2-3-4).
  - ▪ A list for the same numbers with different colors (e.g., red 11, blue 11, yellow 11).
- **Advantages of Using Lists:**
  - o Simplifies block validation.
  - o Allows dynamic movement of tiles, essential for handling jokers.
  - o Provides flexibility for adjustments when fake jokers replace actual jokers.
- **Limitations of Fixed-Size Arrays:**
  - o While fixed-size arrays can store all tiles, they lack flexibility for dynamic block management.
  - o Multi-dimensional arrays or linked lists offer better modularity, maintainability, and performance.

Conclusion

The management of tiles in Okey gameplay requires dynamic and efficient data structures to handle continuous additions, removals, and validations. Multi-dimensional arrays or linked lists are preferred for their flexibility and ease of block management, especially when handling joker tiles. Fixed-size arrays, though simple, are less suited for the dynamic requirements of the game.

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