

# Matching Cards Game

## Code Documentation and Overview

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### 1. Card Class

- **Functionality:** The Card class serves as a base class for all card types, managing common attributes like number, faceup (visibility), and ph (a placeholder character for card symbols).
- **Key Methods:**
  - `display()`: Displays the card, either showing the number or a placeholder depending on whether it's face-up or face-down.
  - `reveal()` and `hide()`: Control the visibility of the card, revealing or hiding it.
  - `operator==`: Compares two cards for equality based on their attributes (number and type).

### 2. StandardCard Class

- **Functionality:** This class inherits from Card and represents a regular card in the game. It is initialized with a number (1 to 6) and a face-up state.
- **Key Methods:**
  - `display()`: Shows the card number (if face-up) or a placeholder.

### 3. BonusCard Class

- **Functionality:** Inherits from Card and represents a special card that grants a bonus.
- **Key Methods:**
  - `getBonus()`: Returns the bonus value.
  - `display()`: Displays the card with a "B" after the number if face-up.
  - **Behavior:**
    - **Match Behavior:** When two Bonus cards are matched, the player has two options:
      - Gain 2 points.
      - Gain 1 point and take an extra turn.
    - If only one Bonus card is matched, the player gains 1 point.

### 4. PenaltyCard Class

- **Functionality:** Inherits from Card and represents a special card that imposes a penalty.

- Key Methods:
  - `get_Penalty()`: Returns the penalty value.
  - `display()`: Displays the card with a "P" after the number if face-up.
  - Behavior:
    - Match Behavior: When two Penalty cards are matched, the player has two options:
      - Lose 2 points.
      - Skip their next turn.
    - If only one Penalty card is matched, the player loses 1 point.

Note: the Ph is a char placeholder it holds “ ” in Standard, Bonus and Penalty Cards but when a card is removed a Card object with Ph “\_” populates the removed Card as a place holder that represents empty card slot.

## 5. Deck Class

- Functionality: Manages the deck of cards, including creating the deck, shuffling it, and removing matched cards.
- Key Methods:
  - `shuffle()`: Shuffles the deck randomly.
  - `removeCard()`: Removes a card from the deck (replaces it with a placeholder).
  - `displayGrid()`: Displays the entire grid of cards (4x4 grid).
  - `faceUpAll()`: Reveals all cards in the deck.

## 6. Player Class

- Functionality: Represents a player in the game, managing their name, score, and turns.
- Key Methods:
  - `displayScore()`: Displays the player's score.
  - `reveal()` and `hide()`: Allows the player to reveal or hide cards in the game.
  - `setTurnI()` and `setTurnEx()`: Control the player's current turn state (internal and external turns).

## 7. Game Class

- Functionality: The main class that manages the flow of the game, including player turns, card actions, and game-ending conditions.
- Key Methods:
  - `initializeGame()`: Sets up the game with two players and a shuffled deck.
  - `playTurn()`: Executes a single turn for a player, where they select two cards to reveal and take action based on the card types.
  - `action()`: Handles the action when two cards are revealed and checks if they match. The action includes checking for special cards like Bonus and Penalty.
  - `isOver()`: Checks if the game is over (i.e., no cards are left to match).
  - `gameDisplay()`: Displays the current game state, including the deck and players' scores.
  - `finale()`: This method is designed for a special case in the final stage of the game where only one card is left it could be either a bonus or a penalty card so it automatically returns either the Bonus or the Penalty so it can be added to the score later.

- flow(): The main game loop that alternates between the players' turns and checks for game completion. Turn Management according to game rules.

## Special Card Behaviors

### Bonus Cards:

- Behavior on Match:
  - When two Bonus cards are matched, the player is given a choice:
    1. Gain 2 points – the player gains points based on the bonus card's value.
    2. Gain 1 point and take an extra turn – the player gains a smaller bonus but gets another chance to play immediately after.
- Impact on Gameplay:
  - Bonus cards encourage players to focus on matching these cards for a higher score or additional turns, influencing the overall strategy.

### Penalty Cards:

- Behavior on Match:
  - When two Penalty cards are matched, the player is given a choice:
    1. Lose 2 points – the player loses points.
    2. Skip next turn – the player can opt to skip their next turn, which affects the flow of the game by reducing the number of available moves.
- Impact on Gameplay:
  - Penalty cards create a strategic element where players may lose points or delay the opponent's progress, which can be especially useful in competitive gameplay.

### Matching Standard Cards:

- When two standard cards (without any bonus or penalty) are matched, the player simply gains 1 point. This provides a simple mechanism for gaining points and keeps the game moving forward.

### Matching Mixed Card Pair (Penalty + Bonus):

- Nothing happens, and both cards are removed from deck.

## Game Flow:

- Players take turns selecting two cards to reveal, with matching cards resulting in points or actions. If two cards match, they are removed from the deck. The game ends when all cards have been matched or removed, and the player with the most points wins.

