

# ***Assignment Project: Puss in Boots' Magical Library Management***



## ***Objective:***

Help Puss in Boots manage the magical library in his enchanted kingdom. Utilize various data structures to handle book checkouts, returns, inventory management, and special magical book requests. This project will require the implementation of Array-Lists, Linked-Lists, stacks, queues, and recursion.

## ***System Representation:***

### **1. Array-List:**

- Use an Array-List to store the library's catalog of magical books. Implement methods to add, remove, and search for books in the catalog.

### **2. LinkedList:**

- Maintain a LinkedList to track the history of borrowed books. Implement methods to add borrowed books to the list and remove them when returned.

### **3. Stack:**

- Use a stack to manage a history of recent search queries and allow Puss in Boots to revisit previous searches. Implement methods to push new queries and pop old ones.

### **4. Queue:**

- Implement (Array-Based) a circular queue to handle special magical book requests. When a magical book is returned, fulfill the first request in the queue. Implement methods to add new requests and process them in order.

### **5. Recursion:**

- Use recursion to generate inventory reports that list all books currently in the library and those that are borrowed, categorized by genre or magical properties.

## ***Output Requirements:***



- For each user action (checkout, return, search, request), print the current state of the catalog, the borrowed books list, and the request queue.
- Upon generating an inventory report, print the list of books categorized by genre or magical properties.

**Walkthrough:**

- At each step, print the following information:
  - **Current Catalog (Array-List):** Show the current list of books.
  - **Borrowed Books (LinkedList):** Display the list of borrowed books.
  - **Request Queue:** Show the current book requests.
  - **Search History (Stack):** List the recent search queries.

<p><b>Genre: Adventure</b></p> <ol style="list-style-type: none"> <li>1. The Enchanted Sword of Galladorn</li> <li>2. Puss in Boots and the Crystal Cave</li> <li>3. The Pirate King's Treasure Map</li> <li>4. Voyage to the Edge of the World</li> </ol> <p><b>Genre: Mystery</b></p> <ol style="list-style-type: none"> <li>1. The Secret of the Moonlit Forest</li> <li>2. The Haunted Castle on the Hill</li> <li>3. Whispers from the Wishing Well</li> <li>4. The Case of the Missing Spells</li> </ol> <p><b>Genre: Fantasy</b></p> <ol style="list-style-type: none"> <li>1. The Sorcerer's Guide to Alchemy</li> <li>2. Legend of the Golden Paw</li> <li>3. The Dragon Whisperer's Handbook</li> <li>4. The Tales of Elven Magic</li> </ol> <p><b>Genre: Historical</b></p> <ol style="list-style-type: none"> <li>1. The Chronicles of the Ancient Kingdoms</li> <li>2. The Royal Scrolls of Aragonia</li> <li>3. The Warrior Queen's Legacy</li> <li>4. The Knights of the Round Table</li> </ol>	<p><b>Magical Properties: Elemental Control</b></p> <ol style="list-style-type: none"> <li>1. The Fire Master's Grimoire</li> <li>2. Whispering Winds and Waterfalls</li> <li>3. The Earth Shaper's Guide</li> <li>4. Storm-bringer: Secrets of Lightning</li> </ol> <p><b>Magical Properties: Healing</b></p> <ol style="list-style-type: none"> <li>1. Elixirs and Remedies for the Brave</li> <li>2. The Healer's Handbook</li> <li>3. Potion Brewing for Health and Vitality</li> <li>4. The Sacred Art of Restoration</li> </ol> <p><b>Magical Properties: Enchantment</b></p> <ol style="list-style-type: none"> <li>1. The Book of Binding and Bewitching</li> <li>2. Enchantments of the Enchanted Isles</li> <li>3. Spells for the Silver Moon</li> <li>4. The Enchanter's Spell-book</li> </ol>
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- **Code Implementation:** Custom implementations for Array-List, LinkedList, Stack, and Queue. Print the catalog, borrowed books list, request queue, and search history at each step. **Submission:** 25/12/2024