Design Rationale

Mini Library Management System (Python)

The purpose of this mini library management system is to manage books and members using efficient data structures in Python. The design emphasizes simplicity, readability, and scalability while maintaining all essential library operations such as adding, updating, deleting, borrowing, and returning books.

1. Use of Dictionaries

Dictionaries were chosen to represent books because they allow data to be stored and accessed using unique keys — in this case, the ISBN number. Each book's ISBN acts as a primary identifier, which ensures there are no duplicates and makes searching and updating extremely efficient. Dictionaries also support flexible value types, allowing nested details such as title, author, genre, and number of copies to be stored in a single structure.

2. Use of Lists

A list was used to store members because membership records grow dynamically as users are added or removed. Each element in the list is a dictionary representing a single member's details, including their ID, name, email, and borrowed books. This allows iteration through members when searching, updating, or deleting records.

3. Use of Tuples

Tuples were chosen to store valid genres because their immutability ensures that the genre list remains consistent throughout program execution. This prevents accidental modification and guarantees that only predefined genres (such as Fiction, Non-Fiction, and Sci-Fi) are accepted.

4. Functional Approach

Each major operation—add, update, delete, search, borrow, and return—is implemented as a separate function. This modular structure improves maintainability, readability, and testing. Each function performs input validation before modifying data, ensuring the system remains stable and error-free.

Summary

Dictionaries, lists, and tuples were selected due to their simplicity, built-in efficiency, and alignment with the project's objectives. The final design demonstrates how Python's core data structures can be combined to create a lightweight yet functional management system that mirrors real-world library operations effectively.