Simulasi UTP Data Structures

Soal

BookHaven

A newly established digital library, **BookHaven**, wants to develop a system for managing book borrowing and returning efficiently. You, as an experienced programmer, are tasked with building a program in **C language** using a **hash table with chaining method** to handle book transactions.

The program should have the following functionalities:

1. **Borrow a Book**
2. **View Borrowed Books**
3. **Return a Book**
4. **Exit**

```
====================================
    BookHaven Library Management
====================================
1. Borrow a Book
2. View Borrowed Books
3. Return a Book
4. Exit

====================================
Enter your choice: 1
```

1. Borrow a Book

If the user selects this option, the program should:

- Prompt the user to enter their **full name** (3-30 characters).
- Prompt the user to enter their **library ID** (must start with "LIB-" followed by exactly 5 digits).
- Prompt the user to enter the **book title** (3-50 characters).
- Prompt the user to enter the **borrowing duration** (1-30 days).

Book Borrowing ID Generation

The system should generate a **unique Borrowing ID** using the following format:
BBXXX

- **BB** = First two characters of the book title (uppercase).

- **XXX** = A random number between 000 – 999.

Example:
Book Title: *Harry Potter* → Borrowing ID: **HA235**

Hash Table Key Calculation (Mid-Square Division Method)

1. Take the **last three digits** of the Borrowing ID as the number (**N**).

2. Square the number (**N²**).

3. Extract the **middle digits** of the squared result.

4. Compute the **hash key** as follows:

Key = (Middle Digits of (N²)) % Table Size
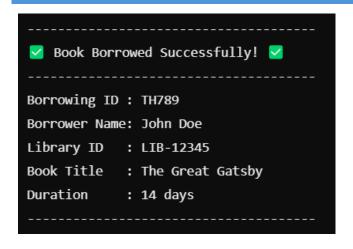
Table Size = 100

Example Calculation:

- Borrowing ID: **HA568** → Take **568**

- Square it: **568² = 322624**

- Extract the middle digits: **26**

- Compute key: **26 % 100 = 26**

The book entry is stored at index **26** in the hash table.

After storing the data, display a success message.

```
Enter your full name: John Doe
Enter your library ID (format: LIB-xxxxx): LIB-12345
Enter the book title: The Great Gatsby
Enter borrowing duration (1-30 days): 14
```

```
--------------------------------------
✅ Book Borrowed Successfully! ✅
--------------------------------------
Borrowing ID : TH789
Borrower Name: John Doe
Library ID   : LIB-12345
Book Title   : The Great Gatsby
Duration     : 14 days
--------------------------------------
```

2. View Borrowed Books

- If no books are borrowed, display a message:
  "No books borrowed yet."

- Otherwise, display all borrowed books.

```
====================================
    Borrowed Books List
====================================
Borrowing ID : TH789
Borrower Name: John Doe
Library ID   : LIB-12345
Book Title   : The Great Gatsby
Duration     : 14 days
--------------------------------------
```

```
====================================
No books borrowed yet.
====================================
```

3. Return a Book

- If no books are borrowed, display a message:
  "No books found."

- Otherwise, show all borrowed books and prompt the user to enter the **Borrowing ID**.

- If the entered ID does not exist, display an error message.

- If found, remove the book from the system and show a success message.

4. Exit

- Close the program.