

```
#include <iostream>
#include <string>
using namespace std;

class LibraryItem
{
private:
    string title;
    string author;
    int year;

public:
    LibraryItem(string title, string author, int year)
    {
        this->title = title;
        this->author = author;
        this->year = year;
    }

    string getTitle()
    {
        return title;
    }

    string getAuthor()
    {
        return author;
    }

    void display()
    {
        cout << "Title: " << title << endl;
        cout << "Author: " << author << endl;
        cout << "Year of Publication: " << year << endl;
    }
};

class Book : public LibraryItem
{
private:
    int pages;

public:
    Book(string title, string author, int year, int pages) : LibraryItem(title, author, year)
    {
        this->pages = pages;
    }

    void display()
    {
        LibraryItem::display();
        cout << "Number of Pages: " << pages << endl;
    }
};

class Magazine : public LibraryItem
{
private:
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        int issueNumber;

public:
    Magazine(string title, string author, int year, int issueNumber) : LibraryItem(title,
author, year)
    {
        this->issueNumber = issueNumber;
    }
    void display()
    {
        LibraryItem::display();
        cout << "Issue Number: " << issueNumber << endl;
    }
};

class LibraryNode
{
public:
    LibraryItem *item;
    LibraryNode *next;

    LibraryNode(LibraryItem *item)
    {
        this->item = item;
        next = NULL;
    }
};

class LibraryLinkedList
{
private:
    LibraryNode *head;
    LibraryNode *tail;

public:
    LibraryLinkedList()
    {
        head = NULL;
        tail = NULL;
    }

    void addItem(LibraryItem *item)
    {
        LibraryNode *newNode = new LibraryNode(item);
        if (!head)
        {
            head = newNode;
            tail = newNode;
        }
        else
        {
            tail->next = newNode;
            tail = newNode;
        }
    }

    void displayItems()
    {

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        LibraryNode *current = head;
        while (current)
        {
            current->item->display();
            cout << "-----\n";
            current = current->next;
        }
    }

    LibraryNode *getHead()
    {
        return head;
    }

    ~LibraryLinkedList()
    {
        while (head)
        {
            LibraryNode *temp = head;
            head = head->next;
            delete temp->item;
            delete temp;
        }
    }
};

class Library
{
private:
    LibraryLinkedList collection;

public:
    void addItem(LibraryItem *item)
    {
        collection.addItem(item);
    }

    void displayItems()
    {
        collection.displayItems();
    }

    void searchItemsByTitle(string searchTerm)
    {
        bool found = false;

        // Convert the search term to lowercase for case-insensitive search
        for (int i = 0; i < searchTerm.length(); i++)
        {
            if (searchTerm[i] >= 'A' && searchTerm[i] <= 'Z')
            {
                searchTerm[i] = searchTerm[i] - 'A' + 'a'; // Convert uppercase to lowercase
            }
        }

        // Get the head of the linked list
        LibraryNode *current = collection.getHead();
    }
};

```

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        // Iterate through the linked list
        while (current)
        {
            string title = current->item->getTitle();

            // Convert the title to lowercase for case-insensitive comparison
            for (int j = 0; j < title.length(); j++)
            {
                if (title[j] >= 'A' && title[j] <= 'Z')
                {
                    title[j] = title[j] - 'A' + 'a'; // Convert uppercase to lowercase
                }
            }

            // Check if the search term is found in the lowercase title
            if (title.find(searchTerm) != string::npos)
            {
                // Display the item and a separator
                current->item->display();
                cout << "-----" << endl;
                found = true;
            }

            // Move to the next node in the linked list
            current = current->next;
        }

        // If no items matching the search criteria were found, display a message
        if (!found)
        {
            cout << "No items found matching the search criteria." << endl;
        }
    }
};

class Person
{
protected:
    string name, address, phone_number;
    double age;

public:
    Person(string name = "unknown", string address = "unknown", string phone_number =
"unknown", double age = 0)
    {
        this->name = name;
        this->address = address;
        this->phone_number = phone_number;
        this->age = age;
    }

    void setage(double age)
    {
        this->age = age;
    }

    double getage()
    {
        return age;
    }
};

```

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    }

    string getName()
    {
        return name;
    }

    void Display_person()
    {
        cout << "Your name is " << name << endl
            << "Your address is " << address << endl
            << "Your phone number is " << phone_number << endl
            << "Your age is " << age << " years " << endl;
    }
};

class Staff : public Person
{
public:
    Staff(string name) : Person(name) {}

    void addItemToLibrary(LibraryItem *item, Library &library)
    {
        library.addItem(item);
        cout << getName() << " added an item to the library." << endl;
    }

    void displayLibraryCollection(Library &library)
    {
        cout << getName() << " is displaying the library's collection:" << endl;
        library.displayItems();
    }
};

class Patron : public Person
{
private:
    string typeofbook;

public:
    Patron(string name = "unknown", string address = "unknown", string phone_number =
"unknown", double age = 0, string typeofbook = "unknown") : Person(name, address,
phone_number, age)
    {
        this->typeofbook = typeofbook;
    }

    void exploreLibraryCollection(Library &library)
    {
        cout << getName() << " is exploring the library's collection:" << endl;
        library.displayItems();
    }

    void Display_Patron()
    {
        Person::Display_person();
        cout << "the type of book " << typeofbook << endl;
    }
}

```

```

};

int main()
{
    cout << "=====\n";
    cout << "===== Welcome to the library's collection =====\n";
    cout << "=====\n";

    Patron patron("Library Patron 1");

    Library library;
    Staff staff("Library Staff");

    cout << "\nBooks\n"
         << endl;
    Book book1("The Catcher in the Rye", "J.D. Salinger", 1951, 224);
    staff.addItemToLibrary(&book1, library);
    Book book2("To Kill a Mockingbird", "Harper Lee", 1960, 281);
    staff.addItemToLibrary(&book2, library);
    Book book3("The Great Gatsby", "F. Scott Fitzgerald", 1925, 180);
    staff.addItemToLibrary(&book3, library);

    cout << "\nMagazines\n"
         << endl;
    Magazine magazine1("National Geographic", "Susan Goldberg", 2023, 150);
    staff.addItemToLibrary(&magazine1, library);
    Magazine magazine2("The New Yorker", "David Remnick", 2023, 80);
    staff.addItemToLibrary(&magazine2, library);
    cout << "-----\n";

    while (true)
    {
        cout << "\nMenu Options:\n";
        cout << "1. Explore Library Collection\n";
        cout << "2. Search for an Item\n";
        cout << "3. Borrow a book\n";
        cout << "4. Exit\n";

        int choice;
        cout << "\nEnter your choice: ";
        cin >> choice;
        cin.ignore();

        switch (choice)
        {
            case 1:
                patron.exploreLibraryCollection(library);
                break;
            case 2:
                {
                    cout << "Enter the search term (title): ";
                    string searchTerm;
                    cin.ignore();
                    getline(cin, searchTerm);
                    library.searchItemsByTitle(searchTerm);
                }
                break;
            case 3:

```

```

{
    int chosee;
    cout << "1. Do you want to read in the library" << endl;
    cout << "2. Borrow a book" << endl;
    cin >> chosee;
    cin.ignore();

    if (chosee == 1)
    {
        string name, typeofbook;
        cout << "What's your name? ";
        cin.ignore();
        getline(cin, name);
        cout << "Which book do you want to read? ";
        getline(cin, typeofbook);
        cout << "Your name is " << name << endl
             << "You are reading the book " << typeofbook << endl;
    }
    else if (chosee == 2)
    {
        string name, address, phone_number, typeofbook;
        double age;
        cout << "Enter your name: ";
        cin.ignore();
        getline(cin, name);
        cout << "Enter your address: ";
        getline(cin, address);
        cout << "Enter your phone number: ";
        getline(cin, phone_number);
        cout << "Enter your age: ";
        cin >> age;
        cin.ignore();
        cout << "What is the type of book you need? ";
        cin.ignore();
        getline(cin, typeofbook);
        Patron c(name, address, phone_number, age, typeofbook);
        c.Display_Patron();
    }
}
break;
case 4:
    cout << "Thanks!!" << endl;
    return 0;
default:
    cout << "Invalid choice. Please try again." << endl;
    break;
}
}
return 0;
}

```

Output ✓

```
=====
===== Welcome to the library's collection =====
=====

Books

Library Staff added an item to the library.
Library Staff added an item to the library.
Library Staff added an item to the library.

Magazines

Library Staff added an item to the library.
Library Staff added an item to the library.
-----

Menu Options:
1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 1
Library Patron 1 is exploring the library's collection:
Title: The Catcher in the Rye
Author: J.D. Salinger
Year of Publication: 1951
-----
Title: To Kill a Mockingbird
Author: Harper Lee
Year of Publication: 1960
-----
Title: The Great Gatsby
Author: F. Scott Fitzgerald
Year of Publication: 1925
-----
```



Title: National Geographic  
Author: Susan Goldberg  
Year of Publication: 2023  
-----

Title: The New Yorker  
Author: David Remnick  
Year of Publication: 2023  
-----

Menu Options:

1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 2  
Enter the search term (title): National Geographic  
Title: National Geographic  
Author: Susan Goldberg  
Year of Publication: 2023  
-----

Menu Options:

1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 3  
1. Do you want to read in the library  
2. Borrow a book  
1  
What's your name? ahmed maher  
Which book do you want to read? The Catcher in the Rye  
Your name is ahmed maher  
You are reading the book The Catcher in the Rye

Menu Options:

1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 3  
1. Do you want to read in the library  
2. Borrow a book  
2  
Enter your name: Ahmed Maher  
Enter your address: cairo  
Enter your phone number: 01153584418  
Enter your age: 19  
What is the type of book you need? To Kill a Mockingbird  
Your name is Ahmed Maher  
Your address is cairo  
Your phone number is 01153584418  
Your age is 19 years  
the type of book To Kill a Mockingbird

Menu Options:

1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 2  
Enter the search term (title): the red sea  
No items found matching the search criteria.

```
Menu Options:
1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 4
Thanks!!
```

Output ✓

```
=====
===== Welcome to the library's collection =====
=====
```

### Books

Library Staff added an item to the library.  
Library Staff added an item to the library.  
Library Staff added an item to the library.

### Magazines

Library Staff added an item to the library.  
Library Staff added an item to the library.  
-----

Menu Options:

1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 1

Library Patron 1 is exploring the library's collection:

Title: The Catcher in the Rye

Author: J.D. Salinger

Year of Publication: 1951

-----

Title: To Kill a Mockingbird

Author: Harper Lee

Year of Publication: 1960

-----

Title: The Great Gatsby

Author: F. Scott Fitzgerald

Year of Publication: 1925

-----

Title: National Geographic

Author: Susan Goldberg

Year of Publication: 2023

-----

Title: The New Yorker

Author: David Remnick

Year of Publication: 2023

-----

Menu Options:

1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 2

Enter the search term (title): National Geographic

Title: National Geographic  
Author: Susan Goldberg  
Year of Publication: 2023

-----

Menu Options:

- 1. Explore Library Collection
- 2. Search for an Item
- 3. Borrow a book
- 4. Exit

Enter your choice: 3

- 1. Do you want to read in the library
  - 2. Borrow a book
- 1

What's your name? ahmed maher

Which book do you want to read? The Catcher in the Rye

Your name is ahmed maher

You are reading the book The Catcher in the Rye

Menu Options:

- 1. Explore Library Collection
- 2. Search for an Item
- 3. Borrow a book
- 4. Exit

Enter your choice: 3

- 1. Do you want to read in the library
  - 2. Borrow a book
- 2

Enter your name: Ahmed Maher

Enter your address: cairo

Enter your phone number: 01153584418

Enter your age: 19

What is the type of book you need? To Kill a Mockingbird

Your name is Ahmed Maher

Your address is cairo

Your phone number is 01153584418

Your age is 19 years

the type of book To Kill a Mockingbird

Menu Options:

1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 2

Enter the search term (title): the red sea

No items found matching the search criteria.

Menu Options:

1. Explore Library Collection
2. Search for an Item
3. Borrow a book
4. Exit

Enter your choice: 4

Thanks!!