

OEL



BATCH 2021-22

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COURSE NAME	Data Structure and Algorithm
COURSE CODE	CS-218
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PROJECT DETAILS:

Tools and language used in project Library Management System are as follow

- Python 3
- SQL
- SQLite Database
- SQLite Browser

Concepts Covered:

- OOP based approach
- Binary Search
- Merge Sort
- Arrays
- CRUD in Database

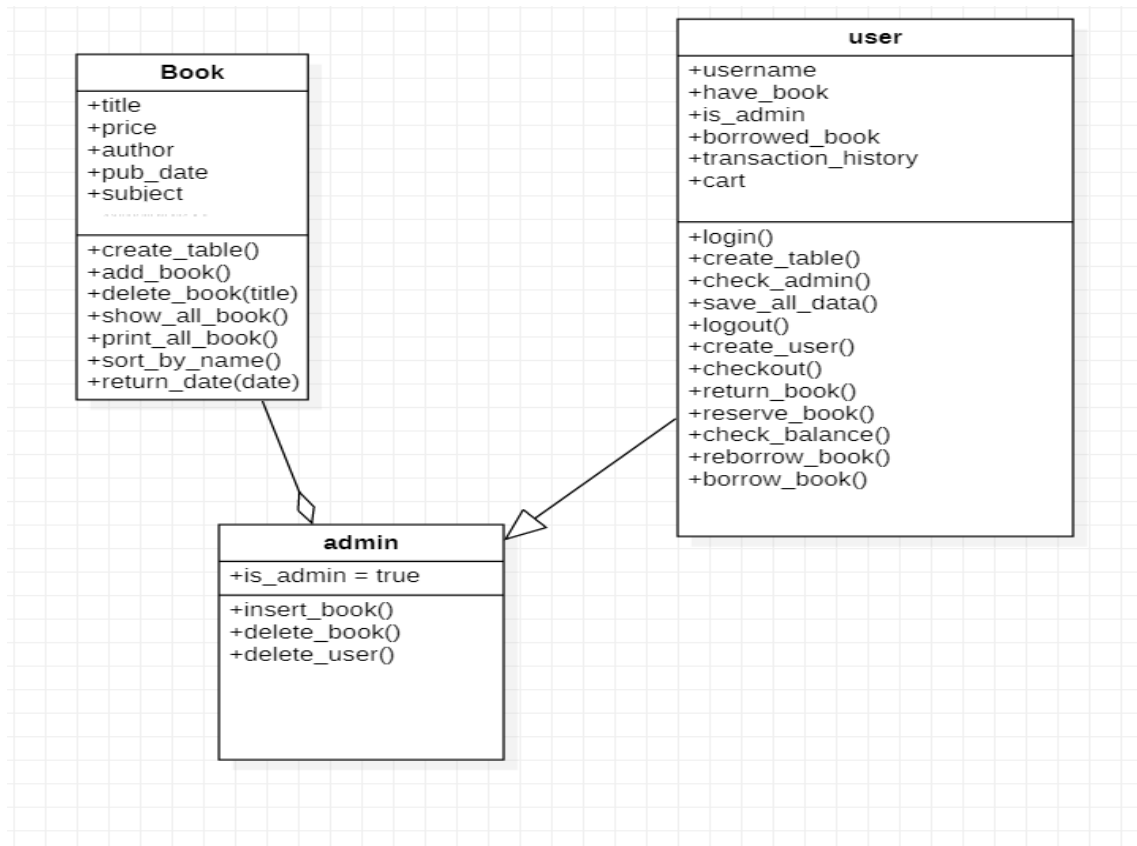
Admin:

- Binary check whether user is admin or not
- Admin can delete and add instances of book in Database
- Admin can cancel subscription of user
- Username is primary key for all operations

User:

- User can return all the books to library
- User can reserve and borrow a book

UML Diagram :



Merge Sort was utilized in method `sort_by_name()` in Book class

Binary search was Utilized in `borrow_book()` in user class

Features:

- All the Data will be stored in sqlite3 database
- Binary Search was used to find key of the book and store its instance to the db. and user account
- Merge sort was used for sorting all the records on the basis of Book name

Limitations:

- User have to insert integer in command line as it will exit the program and you have to rerun it,
- For creating new instance of database, you have to run `make_table()` operation in Book and user class for once only
- It's an CLI version

Merge Sort:

```
61 def sort_by_name(self):
62     cur = db.cursor()
63     cur.execute("SELECT * FROM books")
64     raw_result = cur.fetchall()
65     result = [data[1] for data in raw_result]
66     def mergeSort(arr):
67         if len(arr) > 1:
68             mid = len(arr) // 2
69             L = arr[:mid]
70             R = arr[mid:]
71             mergeSort(L)
72             mergeSort(R)
73             i = j = k = 0
74             while i < len(L) and j < len(R):
75                 if L[i] < R[j]:
76                     arr[k] = L[i]
77                     i += 1
78                 else:
79                     arr[k] = R[j]
80                     j += 1
81                 k += 1
82             while i < len(L):
83                 arr[k] = L[i]
84                 i += 1
85                 k += 1
86             while j < len(R):
87                 arr[k] = R[j]
88                 j += 1
89                 k += 1
90     mergeSort(result)
```

Binary Search:

```
234 def borrow_book(self, id):
235     found = False
236     all_books = Book().show_all_book()
237     low = 0
238     high = len(all_books) - 1
239     mid = 0
240     while low <= high:
241         mid = (high + low) // 2
242
243         if all_books[mid][0] < id:
244             low = mid + 1
245
246         elif all_books[mid][0] > id:
247             high = mid - 1
248         else:
249             print(all_books[mid])
250             self.cart[all_books[mid][1]] = (all_books[mid][5])
251             found = True
252             self.have_book = True
253             break
254     return found
```

Database:

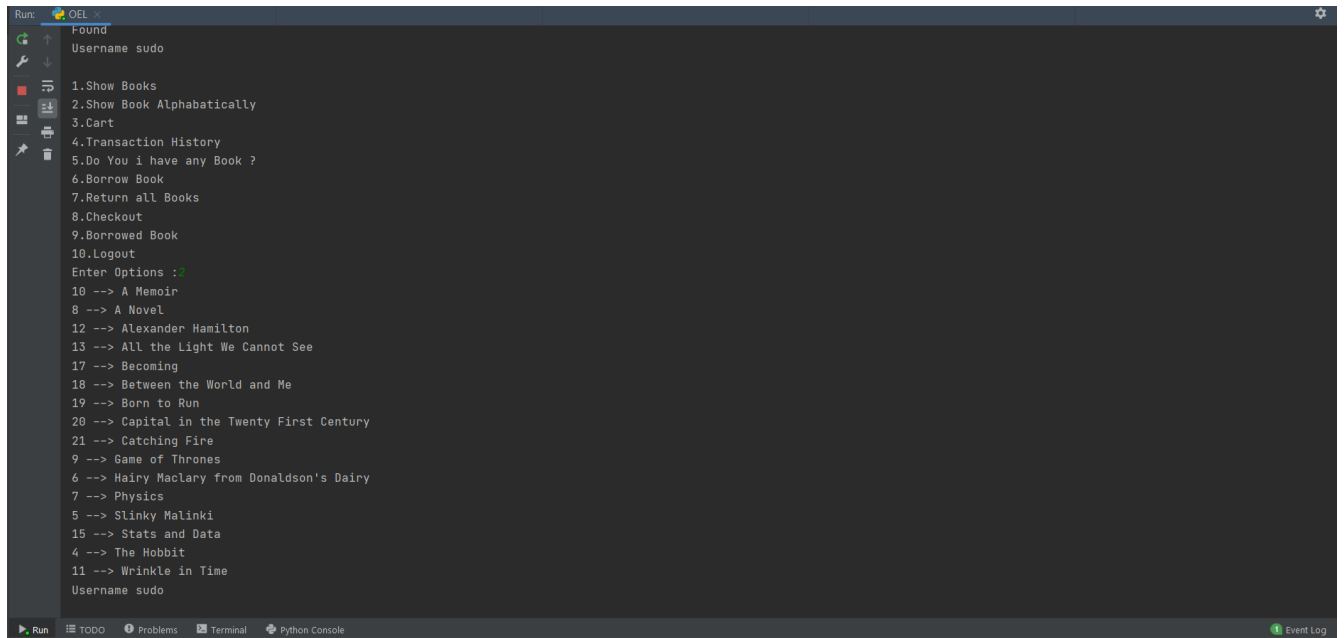
Books Data in SQLite:

Database Structure Browse Data Edit Pragma's Execute SQL						
Table: books						
	bookID	title	author	pub_date	subject	price
	Filter	Filter	Filter	Filter	Filter	Filter
1	4	The Hobbit	J. R. R. Tolkien	1-10-2020	Sci-fi	550.0
2	5	Slinky Malinki	Lynley Dodd	2-12-2004	love	950.0
3	6	Hairy Maclary from Donaldson's Dairy	Lynley Dodd	12-03-2001	Sci-fi	1750.0
4	7	Physics	Einstein	1-05-2009	Exams	220.0
5	8	A Novel	Stephen King	20-09-2021	Novel	720.0
6	9	Game of Thrones	George R. R. Martin	02-03-2012	Novel	7000.0
7	10	A Memoir	Jaycee Dugard	01-03-2017	Novel	400.0
8	11	Wrinkle in Time	Madeleine L'Engle	01-01-2001	Sci-fi	1000.0
9	12	Alexander Hamilton	Ron Chernow	02-01-2014	Novel	1900.0
10	13	All the Light We Cannot See	Anthony Doerr	31-12-2020	Novel	1900.0
11	15	Stats and Data	Hunzala	10-09-2004	Comp ...	100.0
12	17	Becoming	Michelle Obama	1-10-2001	Politics	120.0
13	18	Between the World and Me	Ta-Nehisi Coates	1-2-2020	Love	Ta-...
14	19	Born to Run	Bruce Springsteen	09-05-2003	Fiction	140.0
15	20	Capital in the Twenty First Century	Twenty First ...	Thomas ...	Politics	270.0
16	21	Catching Fire	Suzanne Collins	24-06-2000	Arcade	400.0

User data in SQLite:

New Database Open Database Write Changes Revert Changes Open Project Save Project Attach Database Close Database							
Database Structure Browse Data Edit Pragma's Execute SQL							
Table: users							
	userID	username	password	roll_no	borrowed_book	reserved_book	transaction_history
	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1	12	hunzalam...	1234	CS-20052	['Alexander Hamilton']	1	[{'Alexander Hamilton': 1900.0}]
2	13	raffayah...	sudo	1234	NULL	0	[{'Game of Thrones': 7000.0, 'Physics': 220.0}]
3	14	sudo	4321	Cs-2020	['Physics', 'Stats and Data', 'All the Light We ...	True	[{'Physics': 220.0, 'Stats and Data': 100.0, 'All th...
4	15	admin	1234	master	NULL	NULL	NULL

Sort By Names:



The screenshot shows a VS Code terminal window with a dark theme. The terminal output displays a menu with 10 options for book management. Option 2, 'Show Book Alphabetically', is selected, resulting in a list of 15 books sorted alphabetically by title. The books listed are: Alexander Hamilton, All the Light We Cannot See, Becoming, Between the World and Me, Born to Run, Capital in the Twenty First Century, Catching Fire, Game of Thrones, Hairy Maclary from Donaldson's Dairy, Physics, Slinky Malinki, Stats and Data, The Hobbit, Wrinkle in Time, and an additional entry 'Wrinkle in Time' at the bottom of the list. The terminal interface includes a left sidebar with icons for Explorer, Search, and Run and Debug. The bottom status bar shows 'Run', 'TODO', 'Problems', 'Terminal', and 'Python Console' tabs, with an 'Event Log' icon on the right.

```
Found
Username sudo

1.Show Books
2.Show Book Alphabetically
3.Cart
4.Transaction History
5.Do You i have any Book ?
6.Borrow Book
7.Return all Books
8.Checkout
9.Borrowed Book
10.Logout
Enter Options :
10 --> A Memoir
8 --> A Novel
12 --> Alexander Hamilton
13 --> All the Light We Cannot See
17 --> Becoming
18 --> Between the World and Me
19 --> Born to Run
20 --> Capital in the Twenty First Century
21 --> Catching Fire
9 --> Game of Thrones
6 --> Hairy Maclary from Donaldson's Dairy
7 --> Physics
5 --> Slinky Malinki
15 --> Stats and Data
4 --> The Hobbit
11 --> Wrinkle in Time
Username sudo
```