

Department of Statistics and Computer Science
University of Peradeniya
CSC2021 - Programming using Data Structures
Worksheet 01
INTRODUCTION TO DATA STRUCTURES, ARRAYS

Question 1

BookLife is an online book store service that provides the users the ability to create a personal preference list by inserting book details. The details include,

- ID - rank within the book list
- Book title
- Author(s)
- Rank - Universal book rank according to world book rank.
- Book status - (*already_read*, *reading* or *to_be_read*)

Users should be allowed to order the playlist according to the ***ascending order*** of the ***rank***. The user can start reading from the beginning of the list and the readers can skip to the next book in the list at any given time. Assume that the maximum number of books that can be added to a book list is limited to 15 books.

1. Create a suitable structure to store the mentioned book details including a custom constructor, getters and setters (Assume that the default reading status is to be read).
2. Create a class that can be used to implement different book lists. It should include the following,
 - a. Booklist name
 - b. List of books in the book list
 - c. A constructor to initialize a book list with a name;
 - d. Method to insert books to the book list (new books should always be added to the end of the book list)
 - e. Method to delete a book from the book lists using the id (book list should not contain empty/null cells at the middle. All the empty cells should be shifted to the end of the book list and ids should be changed accordingly)
 - f. Method that can be used to display all the details of books in the book list
 - g. Method to search and return the details of a particular book within the book list found by its name
 - h. Method to modify details of a searched book
 - i. Method to retrieve the details of the book that is currently read
 - j. Method to sort the book list according to the **Rank** (ID should be changed accordingly)
 - k.

3. In the driver class,
 - a. Create a new book list named "My booklist"
 - b. Insert the following book details to the booklist
 - "Uncanny Valley" by Anna Wiener, rank - 10
 - "Weather" by Jenny Offil, rank - 4
 - "Long Bright River" by Liz Moore, rank - 18
 - "The Glass Hotel" by Emily St & John Mandel, rank - 2
 - "Afterlife" by Julia Alvarez, rank 14
 - c. Change the rank of the book "Long Bright River" to 1.
 - d. Change the playing status of "Afterlifer" to 'playing'
 - e. Display the details of the booklist.
 - f. Sort the booklist and display the sorted list.

Question 2

A music producing company that sells many record labels of many genres are planning to implement a system in order to handle the accounting work due to this complexity of calculating their monthly salary. Currently the company produces 5 genres.

- Rock
- Jazz
- Electronic Dance Music
- Hip Hop Music
- Death Metal

The artist details of each label is kept separately and some artists may produce many different genres during one of their albums (*eg: An employee may produce **3 songs** in Rock, **2 songs** in Jazz, **4 songs** in Death Metal in one album which totals to **8 songs** for an album*). The payment is calculated per hour basis and is different for each genre. Maximum of ten artists can produce in a particular genre for a given month. The total salary is calculated as follows,

$$\text{Total Salary} = \sum_{i=1}^5 (\text{No of songs in } i * \text{hourly payment of } i)$$

(the divisions are denoted by i)

eg: If a particular employee A has worked as follows,

Division	Hourly pay amount(\$)	No of songs
Rock	600	18
Electronic Dance Music	800	10
Hip Hop Music	400	20

That particular artists total salary is calculated as,

$$\text{Total Salary} = (600 \times 18) + (800 \times 10) + (400 \times 20) \\ = \$ 26,800$$

Create a suitable Data structure (see the table below to identify the necessary details) to store the album details for the artists in each genre and create all the methods which are needed to manipulate the data structure.

From the diver class , Insert the following working details (details can be found in ***artist_details.txt*** in the following format -> (Album ID, Artist number, No of Songs)) ,calculate and display each artists monthly salary

<div>ID: 1 Genre: Rock Pay rate: 600</div> <div>Work details:</div> <table><tr><td>Artist. No: 1001 No of Songs: 8</td></tr><tr><td>Artist. No: 2001 No of Songs: 4</td></tr><tr><td>Artist. No: 3001 No of Songs: 3</td></tr></table>	Artist. No: 1001 No of Songs: 8	Artist. No: 2001 No of Songs: 4	Artist. No: 3001 No of Songs: 3	<div>ID: 2 Genre: Electronic Dance Music Pay rate: 800</div> <div>Work Details:</div> <table><tr><td>Artist. No: 2001 No of Songs: 7</td></tr><tr><td>Artist. No: 3001 No of Songs: 5</td></tr><tr><td>Artist. No: 1001 No of Songs: 6</td></tr></table>	Artist. No: 2001 No of Songs: 7	Artist. No: 3001 No of Songs: 5	Artist. No: 1001 No of Songs: 6	<div>ID: 3 Genre: Hip Hop Music Pay rate: 400</div> <div>Work Details:</div> <table><tr><td>Artist. No: 1001 No of Songs:5</td></tr><tr><td>Artist. No: 2001 No of Songs: 6</td></tr><tr><td>Artist. No:4001 No of Songs: 4</td></tr></table>	Artist. No: 1001 No of Songs:5	Artist. No: 2001 No of Songs: 6	Artist. No:4001 No of Songs: 4	<div>ID: 4 Genre: Jazz Pay rate: 500</div> <div>Work Details:</div> <table><tr><td>Artist. No: 6001 No of Songs: 8</td></tr><tr><td>Artist. No:4001 No of Songs: 6</td></tr><tr><td>Artist. No: 5001 No of Songs: 7</td></tr></table>	Artist. No: 6001 No of Songs: 8	Artist. No:4001 No of Songs: 6	Artist. No: 5001 No of Songs: 7	<div>ID: 5 Genre: Death Metal Pay rate: 700</div> <div>Work Details:</div> <table><tr><td>Artist. No: 5001 No of Songs: 5</td></tr><tr><td>Artist. No: 3001 No of Songs: 7</td></tr><tr><td>Artist. No:6001 No of Songs: 4</td></tr></table>	Artist. No: 5001 No of Songs: 5	Artist. No: 3001 No of Songs: 7	Artist. No:6001 No of Songs: 4
Artist. No: 1001 No of Songs: 8																			
Artist. No: 2001 No of Songs: 4																			
Artist. No: 3001 No of Songs: 3																			
Artist. No: 2001 No of Songs: 7																			
Artist. No: 3001 No of Songs: 5																			
Artist. No: 1001 No of Songs: 6																			
Artist. No: 1001 No of Songs:5																			
Artist. No: 2001 No of Songs: 6																			
Artist. No:4001 No of Songs: 4																			
Artist. No: 6001 No of Songs: 8																			
Artist. No:4001 No of Songs: 6																			
Artist. No: 5001 No of Songs: 7																			
Artist. No: 5001 No of Songs: 5																			
Artist. No: 3001 No of Songs: 7																			
Artist. No:6001 No of Songs: 4																			