

Chirayu Sharma Day-2 Assignments

Problem Statement 1: Shopping Cart with ArrayList (10 points)

Problem:

Create a simple shopping cart application that allows users to:

Add items to the cart

Remove items from the car

View all items in the cart

Calculate the total price of all items

Requirements:

Use ArrayList to store cart items

Each item should have a name, price, and quantity

Implement methods for all the operations mentioned above

Explanation :-

So Question is asking to make a Shopping Cart application in which we can add items to cart , remove items to card , view all items to cart and calculate the total price of cart by using ArrayList to store cart items and each item should contain name,price and quantity

So After reading this question first thing that came in my mind is to make a Item class having Name, price, and quantity which can be initialized by constructor

Then I am making ShoppingCart class to store items in this this using ArrayList so after initializing a shopping Cart Object you will get a Shopping Cart specific Array in which individual user can add items by using addItems and also perform other operations like Calculate Total Price , View all items and Remove Item.

For Calculate Total Price and View all items i simply used a for each loop to iterate and count or print items and for Remove item i used normal For loop as to prevent index mix match when removing one item in middle of the iteration

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q1.java>

Problem Statement 2 : Student Management with ArrayList (10 points)

Problem:

Create a student management system where you can:

Add new students to a list

Remove students from the list

Search for a student by ID

Display all students

Requirements:

Use ArrayList to store Student objects

Each Student should have ID, name, and grade attributes

Explanation :-

So this Question is asking me to make a Management System where i can add students , remove Students, Search for Student by id and also Display all Student and Each Student should contain ID ,name and grade attributes

So after reading this problem first thing that came in my mind is to make Student class where i can store Student Id, name and Grades and also grades can be of different subject and might need there own class so i made a Grades class to store all subjects like maths ,science , sst, and cs. And in Student class for student id as it is gonna be unique i made a Static class will store current tag and assign to student and increase it one by one and also i think i should add a method to add grades which will then create a new object of Grades class and link it to Student class

So basic setup was made by now i have grades class to store grades and student class to store student details i need to make now Student Management system where i can add student and just in general organize them so first i will make a Array List as it was required in question i will just initialize it and make some method to add, Display , Search and Delete Students in most of them i will use For each loop as it will do most of the work to iterate and for Delete i will just use a simple for loop as deletion in a for each can cause index mismatch and in end in main class i will add some examples using these class and method and printing them

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q2.java>

Problem Statement 3 :- Email Duplicates Remover with HashSet (10 points)

Problem:

Create a program that removes duplicate email addresses from a list of contacts.

Requirements:

Use HashSet to efficiently remove duplicates

Allow adding multiple email addresses

Display the unique email addresses

Explanation :-

So in this problem i have to make a email Duplicate remover that remove duplicate email for the given list of emails and i need to use HashSet for this purpose and user should be allowed to add multiple email

So after reading this problem i can think of making a Email List class where i can use a HashSet to keep all emails when passed through addEmail method and i added constructor to pass email list when creating object only if they need to add more emails later they can use my addEmail Class to add more emails in same object i used addAll method of HashSet to get all element of list in HashSet as it is more cleaner then For Each loop

And in last in main i provided some examples to test the code

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q3.java>

Problem Statement 4 :- Product Inventory with HashMap (15 points)

Problem:

Create a product inventory system using HashMap that allows:

Adding products with their quantities

Updating product quantities

Removing products

Checking if a product is in stock

Requirements:

Use HashMap to store products (name as key, quantity as value)

Implement methods for all operations mentioned above

Explanation :-

So in this problem, I have to make a product inventory system where I can add products, update products, remove products, and also check if a product is in stock. I need to use HashMap to store products, and every product should have a name and quantity.

I will start by making a Product class first with name and quantity and will use a constructor to initialize it. For safety, if a user gives a negative quantity value, it will only add 0. I will use the Math.max method for this.

Then I will start by creating an Inventory class where I will add all products. All the instance variables in this will be a HashMap as mentioned in the question to use it to store inventory. I will use the <String, Integer> convention to store data: String will be the product name and Integer will be the quantity.

Then I will start creating all methods. The first will be the add method, where I will simply put the product in inventory. Then in the update method, I will ask for a product and a new quantity, which I will put back in the inventory as it will overwrite the previous quantity. But I need to check for the negative condition again, so I will use Math.max again. Then I will update the product quantity by the setter method so it will be uniform at all levels.

Then there will be a simple remove method which will remove the product with its name. Then the check method will come. First, I will take out the quantity in another integer variable and check if it's null or not, as the product might not exist and can give an error message. Then I will add a return statement which returns true if the quantity is more than 0.

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q4.java>

Problem Statement 5 :- Browser History with Stack (10 points)

Problem:

Create a simple browser history feature using Stack that allows:

Visiting new websites (pushing URLs to stack)

Going back to previous sites (popping from stack)

Viewing current page

Viewing entire history

Requirements:

Use `java.util.Stack` to implement browser history

Implement methods for all the operations mentioned above

Explanation :-

So in this problem i have to make a system which keeps track of browser history with the help of stack that will allow me to visit new website and adding it to history, visiting previous site, viewing current site and also view entire history and wants to use `java.util.stack` library to do all this.

So after reading this first thing that came in my mind to make a Browser class where i can store site details one by one so first i will make instance variable of String Stack to keep sites details then i will start by making methods first will be `addCurrentSite` method in which i will just ask site url as parameter and push it to stack i don't need to check stack is full or not as java dynamically increases the size then i will make `previous site` method where i will first check if stack is empty or not if it's not empty i will try to pop it out and go back to previous site or if the stack is empty i will just print a error message then i will start by making `viewCurrentPage` method which is a simple method with same stack checker by the help of `isEmpty()` as before and using `peek()` to look at the top of stack. Then the `viewHistory` method will come which is a little interesting so I need to first do a deep copy of the whole stack and store it to a new variable and one by one i Will just pop and print the result to show every site in the browser history.

And in the end it's just main method showing all the examples and all

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q5.java>

Problem Statement 6 :- Employee Records with TreeSet (15 points)

Problem:

Create a program that stores and displays employee records in alphabetical order by name.

Requirements:

Use TreeSet to automatically sort employees by name

Employee class should include ID, name, department, and salary

Should allow adding employees and viewing all employees in sorted order

Explanation :-

So in this problem I have to make an employee record holder program which can store employee records in alphabetical order by name and is asking me to use TreeSet to store the data and each Employee class should also have ID name department salary and data should be viewed in alphabetical order only

So first I will start by making the Employee class which will have id name department and salary and then add setters and getters in the class then constructor method to assign the values to variables but id will not be taken from user it will increase automatically by the static id tag variable which will increase its value once it is taken by some object. Then I need to override the compareTo method as in this question Employee should be compared on the basis of name only

Then the EmployeeList class will come with instance variable TreeSet<Employee> to store employee details in it and I will add addEmployee method in it which will just add employee to list and also I will override the toString in this so it will return and display all the employees in the company

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q6.java>

Problem Statement 7 :- Word Frequency Counter with HashMap (15 points)

Problem:

Create a program that counts the frequency of each word in a text input.

Requirements:

Use HashMap to store words and their counts

Ignore case and punctuation

Display words sorted by frequency (highest first)

Explanation :-

So in this question i have to make a Word Frequency counter where i have to count the frequency of the word appeared in the String given by user and ignore case and punctuation while doing this then at end i have to display the frequency of every word sorted in descending order where highest frequency word will be shown first and i have to store frequency in HashMap only

So I will start by making a Frequency Counter Class where the instance variable will be HashSet to store words. instead of making a method to count frequency I would use constructor only so the user can directly pass it and it will be ready while creation only. To count the frequency first i need to convert all the upper case letters to lower case for uniformity as given in question and remove punctuations too by using regex [^a-z] to convert everything other then this to "" nothing as it will clean the string then to store words individually i need a temp String variable then i will write a for loop to iterate over this new cleaned String and add character to temp one by one until it encounter a space and when it encounter a space just push it to HashSet and Clean the temp state and the process will repeat but there will be no space for last word so i will define a if statement if temp is not empty after loop just push that word to HashMap

Then comes the printing part i will make a separate Method print for it or you can just override toString too and print directly so to sort it according to value i need a temp list and store map in form of array so we can then later sort that according to value as in built in map we can't do that later i will just sort the new list in reverse Order and print it with the help of for each loop there is already custom sort method in list that i can call and pass parameters according to my need for this

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q7.java>

Problem Statement 8 :- Restaurant Menu with LinkedHashMap (10 points)

Problem:

Create a restaurant menu system that:

Stores menu items with their prices

Groups menu items by category (appetizer, main course, dessert)

Allows adding, removing, and updating menu items

Displays the menu by category

Requirements:

Use LinkedHashMap to maintain insertion order of categories

Use HashMap for storing menu items in each category

Each menu item should have a name, description, and price

Explanation :-

So in this Problem i have to make a Restaurant Menu Manager Program where i can add items with there prices , group items by category like appetizer, main course , dessert and general adding , removing and updating menu items i have to use linked hash map to insert items according to categories like if one category inserted first then its item will show first not others and menu items can have any order so i need to use hashMap for it as it should also contain name, description and price

First i will start by creating a FoodItem class where i will store required details of individual food item and use a constructor to define the item name and everything on creation only later with help of getters and setters it can change or get accessed

Then the main menu class will come where i will start by creating a LinkedHashMap Instance to store data in it i will give String as key and HashMap<String,Fooditem> as key as by this i can store categories in a first come first basic order and food items on random order but in a group then i will start creating addFooditems method where p will just check if category is there or not if not there new key will be there and to store that Category new HashMap object will be created and then i will access that category and add the food item which was passed as parameter in it to store by using this type of logic update and remove method will work where with help of category the food item will be located and will be updated or removed as the user wish to do . Then at last i will make Display Items method where i will display items category wise one by one with help of for each loop

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q8.java>

Problem Statement 9 :- Event Calendar with TreeMap (10 points)

Problem:

Create an event calendar application that

Stores events by date

Allows adding and removing events

Displays events for a specific date

Lists all upcoming events

Requirements:

Use TreeMap with date strings as keys for automatic chronological sorting

Each date can have multiple events

Each event should have title, time, and description

Explanation :-

So in this question i have to make a event calendar application that can store event by date , It can add and remove events if needed , display events for specific date and in end list all upcoming events where it should be sorted in chronological order with help of TreeMap and one day can have multiple event and each event should have a title , time and description.

So first I will start making an Event class where I will add title, time and description of the event as an instance variable and which will be initialized with the help of constructor and general getters and setters after making the object too. I need to override the compareTo method in it as the in question event needs to be arranged on the basis of time. and time will be taken as integer in my code but it can be taken as time format i just did that for easy understanding purpose

Then i will start by making EventCalendar class where i will use TreeMap to store event as Day , TreeSet<Event> format so everything will be arranged in order so now first method will be addEvent method which will take String d, Event e as parameters first job will be to convert d to standard date format and then assign it to temp variable date then i will check id there is any event of same date in map if not i will make a hashset new for this date and add this event in it if any error comes in this process i will just display a error message Then there comes displayEvent method which will display all events on a particular day so it will be same first converting d to sdf and then getting all that day event in temp variable and then printing all of it one by one by using for each loop and there will be same try catch block here to capture any error in this process and last will be Display all event which will simply use 2 For each loop to print everything one by one according to date and chronological order

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q9.java>

Problem Statement 10 :- Movie Collection Manager with ArrayList (10 points)

Problem:

Create a movie collection manager that

Stores movie information (title, director, genre, release year, rating)

Allows adding and removing movies

Supports filtering by genre, director, or release year

Sorts movies by different criteria (title, year, rating)

Requirements:

Use ArrayList to store Movie objects

Implement filtering and sorting with comparators

Display movie information in a formatted table

Explanation :-

So in this question I have to make a Movie Collection Manager which can help me store movie information in it which also allows adding and removing movies , Supports filtering by genre , director , etc as per user need and can also sort movies by criteria like title ,year , rating. I need to use a ArrayList to store movie object and have to make a comparators for filtering and sorting movie objects

So first I will start by making a Movie Class item to store single movie information in it and later use Constructor to store values or I can also use getters and setters for the same. Then the Movie Collection class will come where the instance variable will be a arraylist called movieList where i will store movie object one by one then first method will be add movie where user will pass a simple movie object and i will add it to my movieList variable then comes the filter genre method where user will give the genre he wants to see i will use a for each loop to loop through all the list and if any movie object genre meets with user given genre i will print it one by one. And the same will be used for the filter director and year method . then the sort function will be there where the user will give by which criteria it wants to sort and inside there will be multiple if statements which will then help to choose a sorting comparator . but i need to write all types of sort comparator in different files so i will make a Movie comparator class where inside there will be three methods which implements comparator and then i will use compare method in them to return according to user need. Then I will use that file class inside my if statement to sort my movie list and return the sorted version to the user back. The last method is display all, where I will just use for each to display everything .

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/tree/main/Day%202/q10>

Problem Statement 11 :- 1. Implement a simple stack using ArrayDeque that has push, pop, and peek operations.

Explanation :-

So in this question i have to just to make a simple stack program with help of ArrayDeque to do push , pop and peek operations in it

So first i will make a Stack class where instance variable will be a ArrayDeque and then i will make push method where i will directly push my integer then i will make pop operation first i will check if array is non empty and if it's non empty then only i will pop that out i will do same for peek method i need to check if array is non empty and that's it the Stack program is done

Solution:-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q11.java>

Problem Statement 12 :- Write a method that returns the sorted unique elements from an array of integers using TreeSet.

Explanation :-

So i have to make a method which stores unique elements from an array of integers and sort them and i have to use Tree Set

So i will start by making SortElement class where instance will be a treeset to store integers and i will make a constructor to directly pass list at creating to get sorted and also i will make a add element method to just add list or single integer in it to get sorted and to print it i will just overwrite the toString method so it will print every number in ascending order one by one

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q12.java>

Problem Statement 13 :- Write a method that finds and returns common elements between two lists.

Explanation :-

So in this question i have to write a method which take two list and returns common elements between them to user

So i will start by making list class where instance variable will be a arraylist then a method where i will pass integer as parameter and it will start adding to list and then a simple DisplayAll method which will display everything in the list and in the end the compare method which will return a new list with only same elements in both the list where another list is passed as parameter so first i will store all the element of this object list in a hash set then i will make a for each loop for the second list which user will pass and i will check if anything matches btw the hashset and this list and add it to a temp lis with common element only and return it to user

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/blob/main/Day%202/q13.java>

Problem Statement 14 :- Write code that sorts a list of Product objects (name, category, price) first by category in alphabetical order, then by price from lowest to highest.

Explanation :-

So in this question i have to make a Product manager software where i need to add multiple products in it and then arrange it in a particular order provided by question and question is saying to arrange product first by category in alphabetical order and if they are same then by price from lowest to highest

So i will make a product class first where i will store product info like name and all and add getters and setters for setting them with initial constructor too and also i will override toString method to print details when called but main part in this question was to make a custom comparator class so i will start by making a new class q14 comparator and then start writing sort method first i will compare categories btw them and store them in a integer and if it's -1 or +1 i will return same but if it's 0 then it would mean the categories are same so i need to check by price so i will then compare it by price and return the value so by this we can sort this . we just need to make a list of all product and pass it to Collections.sort method and while giving our own list and custom comparator in it and by this we will get our desired output

Solution :-

<https://github.com/ChirayuSharmaWork/Nisum/tree/main/Day%202/q14>