Your Dreams Our Goal

POORNIMA UNIVERSITY

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School of Computer Science & Engineering

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List of DSA Problems

Topic#1: Stack

Project ID	Group	Description
DSA1101	Group#1	Problem Description Consider that a freight train has n railroad cars. Each to be left at different station. They're numbered 1 through n & freight train visits these stations in order n through 1. Obviously, the railroad cars are labeled by their destination. To facilitate removal of the cars from the train, we must rearrange them in ascending order of their number(i.e. 1 through n). When cars are in this order, they can be detached at each station. We rearrange cars at a shunting yard that has input track, output track & k holding tracks between input & output tracks(i.e. holding track). Solution Strategy To rearrange cars, we examine the cars on the input from front to back. If the car being examined is next one in the output arrangement, we move it directly to output track. If not, we move it to the holding track & leave it there until it's time to place it to the output track. The holding tracks operate in a LIFO manner as the cars enter & leave these tracks from top. When rearranging cars only following moves are permitted: A car may be moved from front (i.e. right end) of the input track to the top of one of the holding tracks or to the left end of the output track. A car may be moved from the top of holding track to left end of the output track. The cars initially are in the order 5,8,1,7,4,2,9,6,3. The output should be in order 9,8,7,6,5,4,3,2,1.
DSA1102	Group#2	There are a number of plants in a garden. Each of these plants has been treated with some amount of pesticide. After each day, if any plant has more pesticide than the plant on its left, being weaker than the left one, it dies. You are given the initial values of the pesticide in each of the plants. Print the number of days after which no plant

		dies, i.e. the time after which there are no plants with more pesticide content than the plant to their left. For example, pesticide levels p = [3,6,2,7,5]. Using stack, day 1 plants 2 and 4 die leaving p = [3,2,5]. On day2, plant 3 of the current array dies leaving p = [3,2]. As there is no plant with a higher concentration of pesticide than the one to its left, plants stop dying after day 2. Print no of days after which no plant dies.
DSA1103	Group#3	The Stockspan Problem In the stock span problem, we will solve a financial problem with the help of stacks. Suppose, for a stock, we have a series of n daily price quotes, the span of the stock's price on a particular day is defined as the maximum number of consecutive days for which the price of the stock on the current day is less than or equal to its price on that day. An algorithm which has Quadratic Time Complexity For example, if an array of 7 days prices is given as {100, 80, 60, 70, 60, 75, 85}, then the span values for corresponding 7 days are {1, 1, 1, 2, 1, 4, 6}.
DSA1104	Group#4	Consider the problem of a trapped mouse that tries to find its way to an exit in a maze. The mouse to escape from the maze by systematically trying all the routes. If it reaches s dead end, it retraces its steps to the last position and begins at least one more untried path. For each position, the mouse can go in one of four directions: right, left, down and up. Regardless of how close it is to the exit, it always tries the open paths in this order, which may lead to some unnecessary detours. By retaining information that allows for resuming the search after s dead end is reached, the mouse uses a method called backtracking. The program uses two stacks: one to initialize the maze and another to implement backtracking.
DSA1205	Group#5	Alexa has two stacks of non-negative integers, stack A = [a0, a1, …. an-1] and stack B = [b0, b1, …. bn-1] where index 0 denotes the top of the stack. Alexa challenges Nick to play the following game: In each move, Nick can remove an integer from the top of either stack A or stack B. Nick keeps a running sum of the integers he removes from the two stacks. Nick is disqualified from the game if, at any point, his running sum becomes greater than some integer x given at the beginning of the game.

		Nick's final score is the total number of integers he has removed from the two stacks. Given A, B, and 'x' for 'g' games, find the maximum possible score Nick can achieve (i.e., the maximum number of integers he can remove without being disqualified) during each game and print it on a new line. For each of the games, print an integer on a new line denoting the maximum possible score Nick can achieve without being disqualified.

Topic#2: Sorting & Searching

Project ID	Group	Description
DSA5101	Group#1	Binary search using low and high frequency (20:80) There is an array named CONTACTS of 100 sorted records. Prepare a favorite list of contacts based on first 20 searched contacts. After this the most frequently searched contacts will be stored in an array named FAVORITES of size 10. Next time, when the user performs search operation, the system will first search the contacts in FAVORITES and if it is not found, then only it searches in CONTACTS. FAVORITES array will be updated according to the searching operation. Perform binary search for searching.
DSA5102	Group#2	Binary search using low and high frequency (20:80) There is a linked list named CONTACTS of 100 sorted records. Prepare a favorite list of contacts based on first 20 searched contacts. After this the most frequently searched contacts will be stored in a linked list named FAVORITES of size 10. Next time, when the user performs search operation, the system will first search the contacts in FAVORITES and if it is not found, then only it searches in CONTACTS. FAVORITES array will be updated according to the searching operation. Perform binary search for searching.
DSA5303	Group#3	Quick sort with median as pivot Implement quick sort algorithm on a given array. Consider it's median value as pivot. Produce a comparative study on original Quick sort and Quick sort with median as pivot.
DSA5304	Group#4	Sorting methods evaluation Perform Insertion sort, Quick sort and Merge sort on a given array and produce a table to compare all the above said algorithms.

DSA5205	Group#5	Given three linked list a, b and c of different sizes, find number of distinct triplets (p, q, r) where p belongs to a, q belongs to b and c belongs to c, satisfying the condition: p<=q and q>=r.