

2CS 252 Data Structures Lab (Mini Projects) Due Date: 27 Oct. 2014

Submission : Code on moodle + Presentation / Demonstration

Pair No.	Exam No.	Problem Statement
1	2013BCS055 2013BCS057	When users log into a particular computer system during a given period of time, their login information was automatically recorded in a file. Because the same user may login many times, this file may contain many entries for the same user. There is a need to maintain a log file of login information of the users in which each user is distinct along with the count showing the number of times the user logged in into the system.
2	2013BCS070 2013BCS026	Input inorder and postorder sequences of the binary tree and build the tree.
3	2013BCS008 2013BCS005	Write a program that will check the spellings of the input text. The spell checker should be able to "quickly" find out all spelling mistakes in a given text file written in English. Use any data structure and algorithm of your own choice.
4	2013BCS013 2013BCS034	Suppose that a program is to be designed to provide drill-and-practice exercises in elementary arithmetic. More precisely, suppose that these exercises are problems involving the addition of randomly generated integers. If the student answers correctly, another problem is generated, but if he/she answers incorrectly, the problem is stored so that it can be asked again at the end of the session.
5	2013BCS072 2013BCS073	Write a program to store employee records in a data file. Read the data file print the list of employee records in alphabetical order. (Use Tree to store the records and for further processing).
6	2013BCS035 2013BCS036	<p>The exam in your class consists of 20 multiple choice questions. Write a program for following input and output requirements. Use appropriate data structures.</p> <p>Input:</p> <p>The first line in your data file contains the correct answers for 20 questions (i.e. the first 20 characters). They are followed by an integer number that says how many students appear for the exam (call it n).</p> <p>The next n lines contain student answers in the first 20 character positions [the unanswered question is represented as N], followed by the student's name in the next 20 character positions and roll number.</p> <p>Output:</p> <p>a. For each student – Roll number, name of student, followed by number of correct answers i.e. score.</p> <p>b. Find the list of top 10 scorers.</p> <p>c. Assume minimum 40% score is required for passing. Find percentage of passed students.</p> <p>d. Find difficulty level for each question.</p> <p>Imagine what information can be extracted from the given data and give additional functionalities.</p>
7	2013BCS041 2013BCS043	<p>Write a program to find minimum spanning tree in a graph. At the end, print the weight of spanning tree. [Note: Use Prim's Algorithm]</p> <p>A suggested output format is as below:</p> <p>Source Vertex Target Vertex Weight</p> <p>...</p> <p>...</p> <p>Total Weight of Spanning Tree:</p>

Pair No.	Exam No.	Problem Statement
8	2013BCS002 2013BCS050	A goat, a wolf and a salad are on one side of a river and you need to get them to the other side using your boat. You can carry one item in your boat to the other side at any given time. However, when the goat and the wolf are left alone the wolf will eat the goat. If the goat and the salad are left alone the goat will eat the salad. As long as you are with them nothing will happen, i.e. the wolf won't eat the goat and the goat won't eat the salad. Write a program which determines an order in which you carry them all to the other side.
9	2013BCS100 2013BCS082	A limited number of tickets for the cricket championship go on sale tomorrow, and ticket orders are to be filled in the order in which they are received. Write a program that a box-office cashier can use to enter the names, addresses and cities of the persons ordering tickets together with the number of tickets requested and store this information in a list. The program should then produce a sequence of mailing labels (name, address, city, number of tickets) for orders that can be filled. Also count number of tickets booked city-wise. Note: The program must check that no one receives more than four tickets and that multiple requests from the same person are disallowed.
10	2013BCS014 2013BCS095	Project Given in text book "Data Structures : A Pseudocode Approach with C" by Gilberg and Forouzan : Chapter 5 – General Linear Lists – Exercise No. 26 (student data)
11	2013BCS022 2013BCS018	The Bashemin Parking Garage contains a single lane which can hold up to 10 cars. There is only a single entrance/exit to the garage at one end of the lane. If a customer arrives to pick up a car that is not nearest the exit, all cars blocking its path are moved out, the customer car is driven out, and the other cars are restored in the order they were in originally. Write a program that processes a group of input lines. Each input line contains an 'A' for arrival or a 'D' for departure, and a license plate number. Cars are assumed to arrive and depart in the order specified by the input. The program should print a message whenever a car arrives or departs. When a car arrives, the message should specify whether or not there is room for the car in the garage. If there is no room, the car leaves without entering the garage. When a car departs, the message should include the number of times that the car was moved out of the garage to allow other cars to depart.
12	2013BCS089 2013BCS040	Suppose we have arrays preorder[n], inorder[n] and postorder[n] positions respectively of each node n of a tree. Write a program that tells whether node i is an ancestor of node j, for any pair of nodes i and j.
13	2013BCS007 2013BCS006	Create a graph storing names of the cities and the flight number and cost of the flight. Write a function that will accept two cities as input and find the flight number and the cost of flight.
14	2013BCS024 2013BCS027	Write a program to find maximal spanning tree in a graph. At the end, print the weight of spanning tree. [devise algorithm based on Kruskal's Algorithm] A suggested output format is as below: Source Vertex Target Vertex Weight ... Total Weight of Spanning Tree:

Pair No.	Exam No.	Problem Statement																																												
15	2013BCS046 2013BCS045	The application to be developed uses doubly linked list operations to insert letters from a word randomly at both the front and the back of the list. The resulting characters in the list create a word jumble puzzle. The program prompts the user to enter the number of words that the program should jumble. In each iteration of a loop a prompt asks the user to enter a word. For each successive character word[0] to word[word_length-1], a random integer with value 0 or 1 specifies whether to insert the character at the front or the rear of the linked list. If the random number is zero, insert the character at the front of the list otherwise insert the character at the end. For the output, the program displays both original word and the jumbled word.																																												
16	2013BCS019 2013BCS015	Write a program that lists your family tree using a doubly linked list and also using a tree structure. Use this concept to show the ancestors and descendents of a person for 2 generations.																																												
17	2013BCS097 2013BCS025	<p>An airline company uses the formula shown below to determine the priority of passengers on the waiting list for overbooked flights.</p> <p>Priority number = $A / 1000 + B - C$</p> <p>where</p> <p>A is the customer's total mileage in the past year</p> <p>B is the number of years in his or her frequent flier program</p> <p>C is a sequence number representing the customer's arrival position when he/she booked the flight</p> <p>Given a file of overbooked customers as shown below:</p> <table><thead><tr><th>Name</th><th>Mileage</th><th>Years</th><th>Sequence</th></tr></thead><tbody><tr><td>Avinash Kale</td><td>53000</td><td>5</td><td>1</td></tr><tr><td>Archana Patil</td><td>89000</td><td>3</td><td>2</td></tr><tr><td>Bipin Mishra</td><td>93000</td><td>3</td><td>3</td></tr><tr><td>Sara Farnandes</td><td>18000</td><td>1</td><td>4</td></tr><tr><td>Manisha Joshi</td><td>76000</td><td>7</td><td>5</td></tr><tr><td>John Brown</td><td>65000</td><td>2</td><td>6</td></tr><tr><td>Sakshi Mehta</td><td>37000</td><td>3</td><td>7</td></tr><tr><td>Krishna Gandhi</td><td>21000</td><td>6</td><td>8</td></tr><tr><td>Deepa Avasthi</td><td>43000</td><td>4</td><td>9</td></tr><tr><td>Esha Chopra</td><td>63000</td><td>3</td><td>10</td></tr></tbody></table> <p>Write a program that reads the file and determines each customer's priority number. The program then builds a priority queue using the priority number and prints a list of waiting customers in priority sequence.</p>	Name	Mileage	Years	Sequence	Avinash Kale	53000	5	1	Archana Patil	89000	3	2	Bipin Mishra	93000	3	3	Sara Farnandes	18000	1	4	Manisha Joshi	76000	7	5	John Brown	65000	2	6	Sakshi Mehta	37000	3	7	Krishna Gandhi	21000	6	8	Deepa Avasthi	43000	4	9	Esha Chopra	63000	3	10
Name	Mileage	Years	Sequence																																											
Avinash Kale	53000	5	1																																											
Archana Patil	89000	3	2																																											
Bipin Mishra	93000	3	3																																											
Sara Farnandes	18000	1	4																																											
Manisha Joshi	76000	7	5																																											
John Brown	65000	2	6																																											
Sakshi Mehta	37000	3	7																																											
Krishna Gandhi	21000	6	8																																											
Deepa Avasthi	43000	4	9																																											
Esha Chopra	63000	3	10																																											
18	2013BCS083 2013BCS087	Project Given in text book "Data Structures : A Pseudocode Approach with C" by Gilberg and Forouzan : Chapter 11 – Graphs – Exercise No. 27																																												
19	2013BCS011 2013BCS010	Input inorder and preorder sequences of the binary tree and build the tree.																																												
20	2013BCS077 2013BCS079	Let G be a graph and m be a given positive integer. Discover whether the nodes of G can be colored in such a way that no two adjacent nodes have the same color yet only m colors are used. Find such combination of colors.																																												

Pair No.	Exam No.	Problem Statement
21	2013BCS004 2013BCS020	Write a program to input following data into a disk file. Code, name, department and salary of the employee in a firm. After creating a file, read the file and find the following: i. Count number of employees per department and show the result. ii. Show department wise total salary of the employees iii. Display alphabetical list of employees with department iv. Given a code show all the details of the employee Use appropriate data structures.
22	2013BCS012 2013BCS044	Project Given in text book “Data Structures : A Pseudocode Approach with C” by Gilberg and Forouzan : Chapter 11 – Graphs – Exercise No. 28
23	2013BCS068 2013BCS066	Mouse Maze Project Given in text book “Data Structures : A Pseudocode Approach with C” by Gilberg and Forouzan : Chapter 3 – Stacks – Exercise 24
24	2013BCS038 2013BCS031	items are being sold and the sales data needs to be stored. Sale data includes item code, date of sale, quantity. For every sale entry program must check whether the
25	2013BCS001 2013BCS023	The Government of India has started a unique identification project, which intends to provide a unique id number to all Indians. This unique id will be used to create a database of Indian residents, and will contain other information like age, income etc. of each person. Write a program to sort this data using the age of each person as a key. Assume that n is the population of India, and that each person is at most 150 years (!) old.
26	2013BCS017 2013BCS096	Given a digraph represented as an adjacency matrix, find the shortest path from a vertex v to all the other vertices in the graph.
27	2013BCS028 2013BCS033	Project Given in text book “Data Structures : A Pseudocode Approach with C” by Gilberg and Forouzan : Chapter 4 – Queues – Exercise No. 22 (simulation of operation of telephone system)
28	2013BCS085 2013BCS098	Find a plateau in a matrix : Find a rectangular region in a matrix with the maximum sum of its elements. The elements may be negative.
29	2013BCS065 2013BCS042	Write a program to find the longest simple path from given vertex in directed graph.
30	2013BCS074 2013BCS093	Two lists of students are given including name and average marks. Use doubly linked lists to store the data. Write a program which arranges both the lists in descending order of marks, then merges them and creates a resultant list such that it also contains the records in descending order of the marks.
31	2013BCS049 2013BCS060	Project Given in text book “Data Structures : A Pseudocode Approach with C” by Gilberg and Forouzan : Chapter 13 – Searching – Exercise 19
32	2013BCS032 2013BCS037	Project Given in text book “Data Structures : A Pseudocode Approach with C” by Gilberg and Forouzan : Chapter 3 – Stacks – Exercise 23
33	2013BCS003 2013BCS062	Project Given in text book “Data Structures : A Pseudocode Approach with C” by Gilberg and Forouzan : Chapter 5 – General Linear Lists – Exercise No. 30 (adding two integer lists)
34	2013BCS076 2013BCS069	Project Given in text book “Data Structures : A Pseudocode Approach with C” by Gilberg and Forouzan : Chapter 5 – General Linear Lists – Exercise No. 34 (Use multilinked list)

Pair No.	Exam No.	Problem Statement
35	2013BCS030 2013BCS056	<p>You have been hired by a law firm that is working on a sex discrimination case. Your firm has obtained a file of income data.</p> <p>Input: A file, incfile, of floating point salary amounts, with one amount per line. Each amount is preceded by a character ('F' for female and 'M' for male). This code is the first character on each input line and is followed by a blank, which separates the code from the amount.</p> <p>Output: 1. All the input data (to reprint) 2. The number of females and their average income. 3. The number of males and their average income. 4. The data needs to be categorized in following income slabs. 0-50000, 50001-100000, 100001-200000, 200001-300000, 300001-above.</p> <p>Show using a bar chart, the number of male and female employees in each category.</p>
36	2013BCS051 2013BCS048	Problem Given in text book "Data Structures : A Pseudocode Approach with C" by Gilberg and Forouzan : Chapter 13 – Searching – Exercise 13
37	2013BCS047 2013BCS029	Project Given in text book "Data Structures : A Pseudocode Approach with C" by Gilberg and Forouzan : Chapter 12 – Sorting – Exercise 26
38	2013BCS058 2013BCS064	<p>In the file 'STUD.DAT' there are 100 records with the following structure:</p> <pre>struct students { int rollno; float permaks; };</pre> <p>In another file 'STUDENTS.DAT' there are 100 records with the following structure:</p> <pre>struct studinfo { int rollno, centreno; char branch[10]; float per; };</pre> <p>However, in this file, in all the 100 records no entry exists in the field per. Write a program to copy the percentage marks from the file 'STUD.DAT' into the file 'STUDENTS.DAT'. See to it that data other than the percentage marks in 'STUDENTS.DAT' remains undisturbed. Note that the roll numbers present in the two files are not necessarily in the same order.</p>
39	2013BCS067 2013BCS092	Write a program to simulate the action of a priority queue used to schedule processes. Let there be three levels of priority. Assume any necessary information.
40	2013BCS009 2013BCS016	Write a program to find Huffman codes for a set of characters, given the frequency of occurrence of each of these characters.
41	2014BCS213 2014BCS201	Write a program that will convert postfix expression into prefix and infix.
42	2014BCS206 2014BCS217	Implement an expression tree and evaluate the expression.

Pair No.	Exam No.	Problem Statement							
43	2014BCS209 2014BCS218	Write a program to check whether two binary trees are topologically and content wise same or not.							
44	2014BCS210 2014BCS211	Write a program to multiply two polynomials represented as singly linked lists of non-zero terms.							
45	2014BCS204 2014BCS216	Suppose there is a number n. If n is squared, then the digits of this square number is squared separately and added. This sum of the square of the digits become the new number. The same process is repeated again until we reach any of these numbers. 1, 4, 16, 20, 37, 42, 58, 89 or 145. If the sum is 1, then conclude that the initial number n is happy else it is not. If the number which is not happy, is known as unhappy. A happy number which is a prime number known as happy prime. Input a list of numbers and classify these as happy, unhappy or happy prime.							
46	2014BCS212 2014BCS205	Write a program that will create a data file containing the list of telephone numbers as shown below: Archana 2300780 Manish 2339090 . . Write an interactive, menu-driven program that will access the file created and implement the following tasks. (Use Binary Search Tree) i. Determine the telephone number of specified person ii. Determine the name if a telephone number is known iii. Update the telephone number, whenever there is a change.							
47	2014BCS202 2014BCS208	Write a program that takes as input a digraph and two of its vertices and print all simple path from one vertex to another.							
48	2014BCS203 2014BCS219	Students enrolled for a Degree course in Computer Science opt for two theory courses, an elective course and two laboratory courses from a list of courses offered for the programme. Design a multi-linked list structure to store the data. For example, <table border="1" style="margin: 10px auto; text-align: center;"><tr><td>RollNo</td><td>Name</td><td>Theory1</td><td>Theory2</td><td>Lab1</td><td>Lab2</td><td>Elective</td></tr></table> <div style="text-align: center; margin: 5px auto;"><div style="display: flex; justify-content: space-around; width: 100%;"><div>↓</div><div>↓</div><div>↓</div><div>↓</div><div>↓</div></div></div> A student may change his/her elective course within a week of the enrollment. At the end of the period, the department takes count of the number of students who have enrolled for a specific course in the theory, laboratory and elective.	RollNo	Name	Theory1	Theory2	Lab1	Lab2	Elective
RollNo	Name	Theory1	Theory2	Lab1	Lab2	Elective			
49	2014BCS214 2014BCS215	Write a program to create a circular linked list containing numbers in descending order. Input an integer x and split the circular list into two circular lists such that numbers till x (including) will be in one circular list and numbers less than x will be in another circular list.							
50	2013BCS063 2012BCS090	Write a program to check whether two binary trees are topologically and content wise same or not.							
51	2012BCS068 2012BCS062 2012BCS088	Perform polynomial addition and multiplication using appropriate data structure.							