PDS LAB [Date: 12th Nov 2024]

Assignment – 9 [Link-lists, Stack & Queue]

Instructions:

1. Create a directory named as Lab-9.
2. Give the name of the program as <p>.c where <p> implies the problem number, like 1.c, 2.c, 3.c, etc. Store all the programs of this week under this directory.
3. You should upload all .c files (1.c, 2.c, 3.c ....) to the Moodle course web page latest by 5.00 PM (without penalty). The cutoff time will be till 5.15 PM with a penalty of 25% on your secured marks (i.e., if you secured 80 marks, after penalty you will get 60 marks). Beyond 5.15 PM, the moodle system will not allow you to submit, as a result you will get zero.

(40 Marks)

(1) A set can be represented by a linked list where a node of the linked list contains an element of the set. Thus a set S = {4, 55, 26, 103} can be stored in a linked list having 4 nodes where 4 is stored in node 1, 55 in node 2, 26 in node 3 and 103 in node 4. Note a set cannot have duplicate elements. With this representation of sets, write C functions to perform the following operations.

(a) Read a set of integers and store them in a linked list.
(b) Insert an element in an existing set.
(c) Verify whether two sets are disjoint.
(d) Perform union and intersection of two sets.
(e) Perform the set difference between two given sets.

Example:
Set-1: {12, 34, 45, 2, 54}
L1-Set-1 : 12 -> 34 -> 45 -> 2 -> 54
Set-2: {2, 45, 78, 32}
L2-Set-2 : 2 -> 45 -> 78 -> 32

Insert into Set-1 : 34
34 cannot be inserted as per set rules
Insert into Set-1 : 99
Set-1: {12, 34, 45, 2, 54, 99}

L1-Set-1 : 12 -> 34 -> 45 -> 2 -> 54 -> 99
L2-Set-2 : 2 -> 45 -> 78 -> 32

Set-1 and Set-2 are not disjoint, because of common element 45

Union of Set-1 and Set-2: {12, 34, 45, 2, 54, 99, 2, 78, 32}
Intersection of Set-1 and Set-2: {45}

Set difference Set-1 – Set-2 : {12, 34, 2, 54, 99}
Set difference Set-2 – Set-1 : {2, 78, 32}

(30 Marks)

(2) Write a C program to check whether the given string is palindrome or not usingstack.
Steps to check the given string is palindrome or not using two stacks :

(i) First capture the string.

(ii) Enter the string into stack-1.

(iii) Enter the reversed string into stack-2.

(iv) Compare the two stacks from top to bottom and comment on the palindrome property of the string

(30 Marks)

(3) Write a C program to enter the data items (say integers) in a queue. After the entry of N items, fetch the items and feed to 2 new queues such that the positive numbers will be in one queue and negative numbers will be in another queue. At the end show the contents of 2 queues which holds the positive and negative numbers.

THE END