Problem Statement

second year lamputer Engineering dars, set A of students like Varilla see-cream & set B of students like butterscotch Ice Ecream write cost program to store two sets using linked lists

Comput of display:

or sch of students who like both varilla & + kutles scotch is set of students who like either varillo @ butterstotch @

not both.

> Number of students who like neither vanilla nos but errotch.

Objectives of To undestand the concepts of oop paradigm. b) To understand usage of linked-lut in creation of dynamic lists in c++.

Out comes.

a) To implement set operations using linked-list data. structure in cpp.

by To write menu driver, model opp oop based classest objects) program in cpp.

of To implement functions in cop (methods in case of danses)

Hard ware Requirement:

Manufactures & Model: Alex, Swiff 3

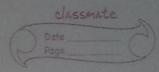
Processor: Intel core is -844 gen. (8265 400 1.8 GH2)

Installed memory: 8GB RAM, 5/2 GBSSD.

Architecture: 64-bit, windows to operating system

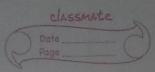
7 Soffware Requirement:

operating System: Windows 10 Upp hersion used: CH14 18 Compiler for (++: 9+ (version 10.1.0) TDE: Lode-blocks (version: 20.03) # Theory: Linked list: Requir linked hit is a linear data structure which store dements in squence. Unlike away they don't occupy consentive memory locations & also they cannot amend by indexing (using subscript operator) requirement. The advantages of using linked list over arrays are 1> The memory wastage in case of linked-lib is very less compared to array as we use only sequired memory. 2) linked his are per benificial in practical usage like were cache memory etc. 3 Insection of deletion operations in linked list are less costlier compared to arrays Types. & Singly linked list 2) Donbly Inked list 3> Corcular United list 4) more advanced like Unalled Indaet list & skip list setc. Singly linked list. This consist of number of node shere can node points to the next node mode of the singly lunked lust can be sepresent as bila. s Node nerbi 11 pointer to ment made

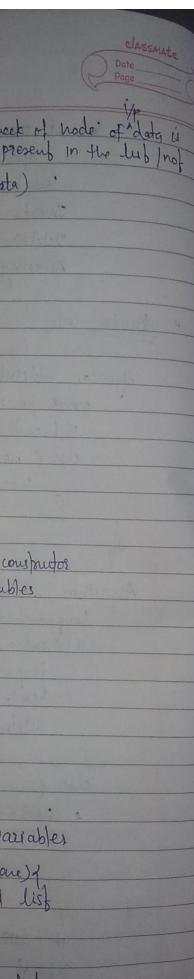


lost of operations in singly lunded lists: operation Time. Queation at beginning 0(1) Insertion of end 0(4) Deletion at it's position · 0(4) Accessing with hode 0(u) Pseudo Codo: Algorithm add Mode (into data) ? I adds node with data given as sp. works newNode = geb NewNode (data); of (head == null): head + heavode. else of newwoods + next + head head + neconode Algorithm delebe Node (11/2 data) of 1/2 detate node of 1/2 data. been exchend If (head => data == data) of beup + head head + head -ruent delete temp else ? curs + head, prev = nell while (wer &f wer + data ! = data) x prev = cues, if (use == null) : pemp (element not found) else of prevented + current nous delete ciss.

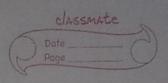
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lost of operation in singly linked lists: operation Time. Quartar al beginning 0(1) Juston of end 0(4) Deletion at vity position = 0(n) Accessing with mode 0(u) Pseudo Codo: Algorithm add Mode (rub data) 1. I adds nocle with data given as 1/2 North new Noch = get New No de (data); of (head == null): head + new Node. else of newworld - next + head head + necovode Algorithm delebe Node (11/6 data) of 1/6 detate node of 1/6 data. beupenhead If (head -> data == data) of beup < head head + head -> nex delete temp else 1 curs < head, prev = null while (cure &f cure + data ! = data) of prev = curr, cure & cure > next. of (curs = = null): permy (element not found) else of preventers + current nont delete cus



Algorithm is fresent (into data) of Mcheck of node of data is Neup - head While (beip = null & beip-data 1 = data) benje benj mest If (temp == null) coroturn a (false); else source 11 tane); + Apt of classes. The clanes used in grogram are: > class Node? privati: up 80/-no; String home; Hode Chest; public: Node (Into soll-no, Azing none) of // constructos (// Initializes instence member variables 2) class linked his / private: Node head; publikate" uniced lisb () of Constructor 1 /1 mitralises nutence member variables word add Noche (Ind soll no , stepp nane) c 1/ code to add node in linked list void delete Node (int 301/. no.) 1 11 code to delete node in Junced list



boid rifreenb (rub 8011.00)?

Il checks wheather 8011.00 is present in link from

void Print the entre list.

et class Scf of private:

[mkedlish students:

public:

void geb Inpub () {

11 takes data of students from the user

void setto-Another Set (Set, s) of used to initialize current set contin set s.

bord add student (11ht 2011-no, string name) ?

set get Union (Sch B) {

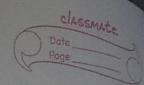
Nempube union of sch B with sch B & Retions it

Set get Intersection (Set B) /
11 conjute intersection of set onthe set B & retien it

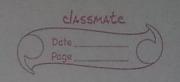
Set get Diff (set B) {

(1) compute difference set 4 returns it

void fambseb() 1



#	Analysis of Algorithms:	Langua Bri			
	1> Checkgas Union of Oh:	Starth Should			
	Time Complexity: The algorithm	m take O(m.	1) time (other		
	me in are the sizes of	two sets.	. when		
	Space Comployorty: The algorit	thm Takes DIM+	h) appear		
	spare the list of union	a cel	speak to		
	The set of order	1 36			
	2> Intersection of Set:				
	Time complexity: The algorithm seques O(MM) time when				
	Space Complexity: The desith	on on Olmins	m.m.		
	Space complexity: The algorithm reg O(min(m,n)) space to stone the intersection set of two i/p sets.				
	3) Pifference of Set:				
	me louplesty. The closether				
	Space complexity: The algorithm sequer o(mxn) time Space complexity: The algorithm sequer o(mxn) time				
	Spare complexity: The algorithm reg. O(ma) space to				
	The second secon	Josh & Blo Bus	,		
	All the operations or which are required to calculate				
	the number of students are just the variations of the above hence they will have some complexity.				
	hence they will have same complexity				
	and the second s				
#	Test Cases:				
	Tall	Ashanaka Islama	3		
No.	Tesblase Description	Experted of ,	Program o/p.		
K	Universal Set:	varionilla 4 bruterrota	vanila & buttered		
	("A; 1 }, ('B', 2 }, 2'c", 3 }, 2'b", 4 }	d y 27,3}}			
	4'E',5}, 4'F",6}, 4'T",7}}	THE STATE OF THE S	~~ "c",3}}		
		ether vanillar	either vanilla		
	(7x', y) -> x is the same of student & y is	butterstotch but	buffersiotet but		
	the goll no.	(4'B" 2}, (0',4),	1 (18; e) 10;4),		



1	Vanol) Set:	2'5",6}, {'12",7}}	<+", 6}, ?\1;7{}
	Bullos coten set:	neither varillar nor bublers totch.	heither varilla na
	4 4"C",3}, 1'f",6}, 17,7}}	4(Nil), 4. E, 5}	244,18,2m=",5}}

Applications:

> Employentation of other data Ametires like stack, queu, ady list representation of graph of.

2) Image viewer.

3) Prev & next page of brassers.

4) Music player

Cardinon:

Linked list provides upper-edge in case of memory usage over arrays. It can be used in practical scenarious but may not be useful always due to its high access time compared to arrays.