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DSA

2322f

Assignment No. 01

(1)

Title : Searching & sorting

Aim : To implement searching and sorting on Array as linear data structure

Problem Statement : consider student database of SE IT class. Database contains different fields of every student like name, Roll No & SGPA.

a) Design a roll No list of student accordingly as ascending order use bubble sort
b) Arrange list of students alphabetically using insertion sort
c) Arrange list of students to find out first ten to from a class use quick sort
d) Search students according to SGPA if more than one students having same SGPA then print list of all students having same SGPA
e) Search a particular student according to name using search without recursion

Objective : To study the concepts of Array of structure. Know the concepts, algorithms and applications of sorting. Understand the concepts, algorithms and application of Searching

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Outcome: Understand linear data structure array of structure. Apply different sorting ~~Sorting~~ techniques on array of structure Apply different searching techniques on array of structure and ~~co~~ calculate time complexity

Theory:

① Linear Data structure: Those data structure where data items are organized sequentially or organised linearly one after another is called linear data structures

Linear Data structure: Stack, queues

Elements can be transversed one at a time. and only element is reached while tranversing

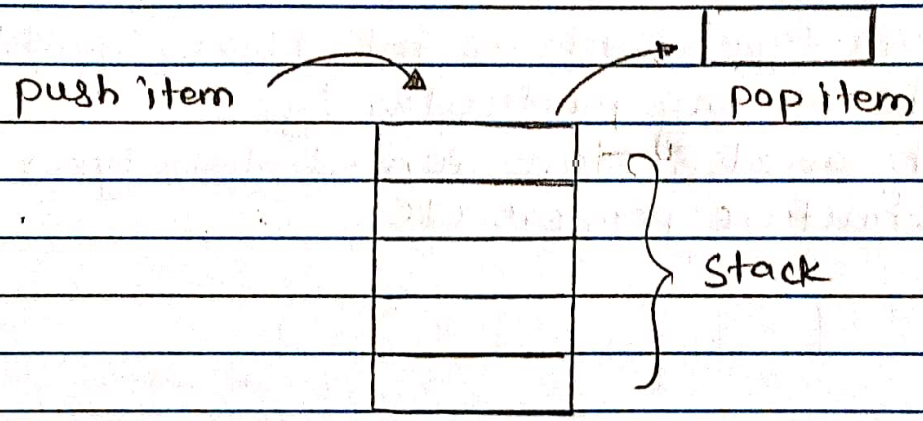
These are easy to implement as computer memory is designed in same fashion

Data structure

Linear	Non-linear
Array	Graph
Stack	Trees
Queue	
Linked list	

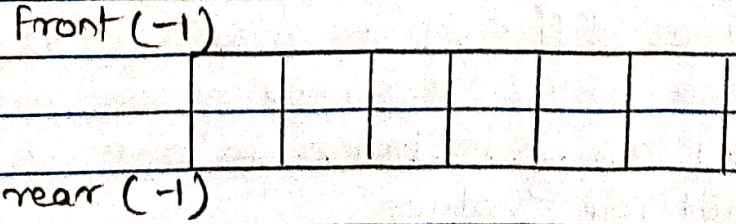
(2) Examples :

Stacks : A LIFO (Last is first out) data structure where element that added at least will be treated as first
Addition and deletion is allowed at only one end i.e on TOP



Queues : It is data structure in which addition is allowed at one end 'rear' and deletion is allowed at 'front'.

It is FIFO Data structure : First in first out



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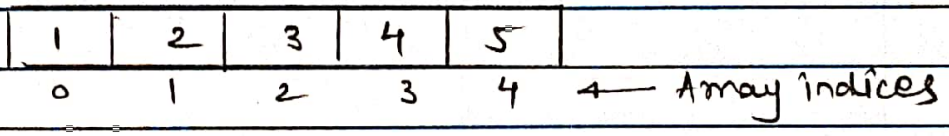
Array :

Array is collection of items stored at contiguous memory locations and elements can be accessed randomly using indice of an array They are used to stored similar type of elements as in data type must be same for all elements They can be used to store collection of primitive data types such as int, float, double, char etc of any particular type
It can also store derived data types such as structure pointers etc



Array length : 5
First index : 0
last index : 4

Need of Array: coe can normal variables cohen coe have small of objects, but if coe coant to store a large number of instances it becomes difficult to manage them with normal variables. The idea of an among is to represent many instance in one variable. To store multiple values.

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Abstract data types: (ADT)

It is type whose behaviour is designed by a set of value and set of operations.
The properties of ADT are its data (representation 'internal state of the each object) and the behaviours of an ADT are its operations of functions (operation on each instances

Structure of ADT:

Name of ADT
Types represented in collection of data type called as Data object..
Each Data object has previously been defined in an ADT
functions that operate on Data.
pre conditions for any function.
post conditions for any function.

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Application of Array:

- Arrays are used to implement vectors and lists which are important of C++ STL.
- Array are also used to implement stack and queues
- Trees also use away implementation
- Matrices which are an important part of mathematical library is implemented using arrays
- Adjacency list implementation of graphs uses vectors which are implemented using array
- All sorting algorithm use arrange as

Basic of Searching and sorting:

Searching - Searching refers to finding an item in an list given contain conditions

Types of Searching techniques:

1. Linear ~~or~~ search or sequential search
2. Binary search
3. fibonnacci Search
4. Recurssive Binary Search
5. ~~Sub list~~ Sublist search
6. Expontial search
7. Jump search

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Sorting : Sorting refers to rearrange all the elements in array in either ascending or descending order

Types of sorting Techniques :

1. Insertion sort
2. Bubble sort
3. quick sort
4. Merge sort
5. Heap sort
6. Selection sort
7. Radix sort
8. Bucket sort

Application of searching & sorting :

Sorting : Commercial computing
Keeping data sorted helps in efficiently searching
Numerical computations
Operations Research

Searching : Dictionary clients
Indexing clients
Sparse vectors & matrices
System symbol table