Mearging , Sorting & searching

Many Computer applications need these ~~activi~~ actives. Sorting alone has been set to account for more than 30% of all Computer time spend.

Sorting & Mearging provide us means of organising information to Fasilited the retrieval of specific data.

Searching methods are design to take the advantage of organisation of information and their by reduce the amount of effort to either Locate. A perticular atom present in set or not.

Sorting algorithm arrange atoms in a set according to predefine ordering relation.

The two most common type of data. are String Information and Numeric Information.

The ordering relation is either in asending order or in desending order as shown in eg:-

{5, 6, 7, 8, 13, 15, 19}

{a, abacus, — — — —, bablou, baby Cap}

Sorting ~~d~~ algorithm usually ~~first~~ falls in two classes.

1) the simpler and Least Sufficticated algorithm are characterised by Fact that they required of the order of n^2 ~~Comparing~~ Comparison (order of n^2). to Sort n items.

The advance sorting algorithm takes order of ($n \log_2 n$) Comparisons to Sort n items.

A Comparison of sorting algorithm Complexsities

n	n^2	$n \log_2 n$	$n^2 / n \log_2 n$
10	100	33.2	3.01
100	10,000	664.4	15.05
1000	10,00,000	9,996.0	100.34

From the above table it clear that as n become Larger the advance method ~~ex~~ establish their Suparility over the simpler method.

* Binary Search -

Problem - given an element x and a set of data that is in Strictly in assend-ing numerical order. find Wether or not x is present in the set

development -

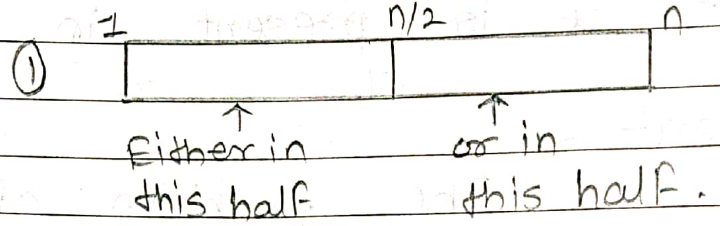
The problem of searching & order List such as dictionary or telephone directory occures in Fryquently in computing in such Situa-tion we probbabley open the directory at a page some where more than 2/3rd of the way through depending on the charactor to be search.

We would then glance at the name at Top of the page we had open & disied from this whether or not we had gone too far. We apply the same strategy again and again till we get the exact search.

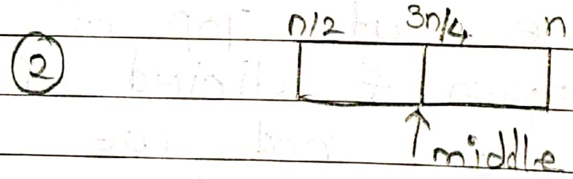
Applying the in techical procedure the above process is the way of binary search.

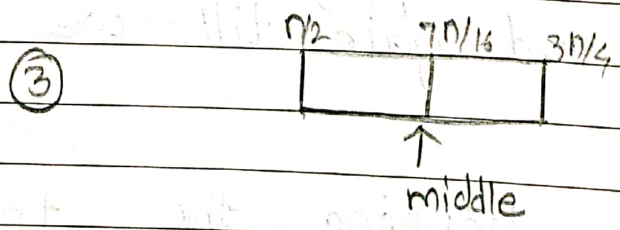
It is easy to see that in all cases the value in the set that we are

Siking is either in the first half of ~~the~~ ~~least~~ list or the second half of the list or it may be at the middle value in the set. as shown in figure.



we can establish ~~by~~ the relevant half by Comparing the Value sort with Value in the middle of set, ~~The~~ This single test will eliminate half of the Vales in the set from further consideration. Now, we have only half the size of original problem as shown below





$$\frac{n/2 + 3n/4}{2} = \frac{7n}{16}$$

We apply strategy again & again till we get the exact search. The halving strategy that we have been consider is oneof the most widely used in method in Computing science, commenetly known as divide & conquer strategy. & searching method is called ~~a~~ binary search.

The general strategy for binary search is repeatedly do

i) examine middle value of the remaining data and on the basis of theis Comparing the elemenate the half of the remaing set. untill the value is ~~Form~~ found.

Algorithm: discription

1) Establish an array a[1,---n] and value that to be search say x.

2) assign the upper and Lower variables to the array limits

eg:- (Lower :=0. Upper:= n)

3) While Lower < upper do

a) Compute the middle Position of array

by (upper + lower) /2
middle := (upper + Lower)/2

b) If the Value sought
is greater than middle value
than adj~~ust~~ust the lower limit
else adjust the upper lim~~it~~it

4) If the array element at lower
position is equal to the Value
~~Sorf~~ Sought than search is successful
no. found. search is successful.
else written no. not found search
is unsuscessful

26-9-18

* Sorting By Selection :-

Given a randomly ordered.
Set of n integers Sort them into
non- desending order (asending)
using se~~le~~ection sort

development -

Selection method is
an important idea in sorting the
data to achieve ~~disiear~~ disired

ordering.

In this method the next smallest Value must be found and placed in the order

for eg:-

a[1]	a[2]	a[3]	a[4]	a[5]	a{6}
20	42	8	5	3	21

→ Unsorted list.

O/P requiring is

3	5	8	20	21	42

→ sorted list

The Sorting Process Perform the ~~two~~ following two step.

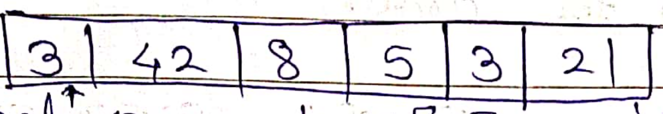
1) find the smallest element in the unsorted array

2) Placed the smallest element in the position of a[1]

& For that following Construction can be use

```
min := a[1]
   For J:=2 to n do
         if a[j] < min then min:=a[j]
   and assign as below
   put a[1] := min.
```

But these is not the Sufficient because we get the position as



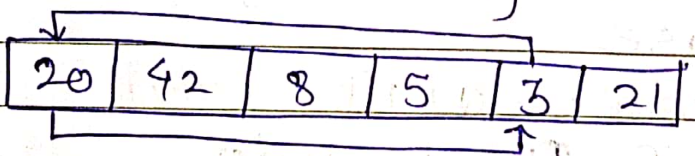
we lost the original no. at a[1] position.

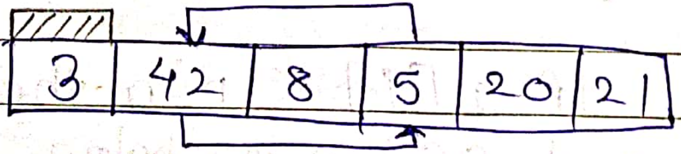
Hence, it is necessary that exchange the element at that position.

& Hence, do as ~~one~~ 1) find the position p & value at ~~p~~ a[p] of the smallest element left in the unsorted array.

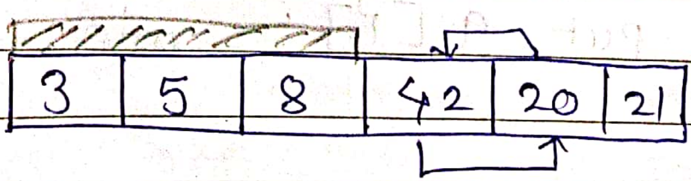
2) exchange the element in a[p] with the element in first position in the unsorted part of ~~of~~ array.

& Hence, our array becomes

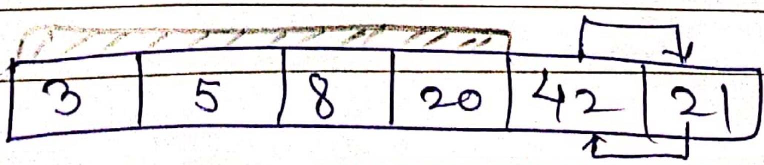




i = 1



i = 2



i = 3

3	5	8	20	21	42

Sorted by selection method.

* Discription.

1) establish an array ~~tha~~ a[1,--n] of n element.

2) While there are still element in the unsorted part of array do

3) . a) Find the minimum and it's Location P in unsorted array a[1....n].

b) exchange the minimum min in the unsorted part of the array with the first element of a[i].

* Bubble Sort :-

This is unother Sorting techinique in which bubbled out the specific element from the list of element this techinique is also called exchange method.

In this method it adopt heavyly exchange mechanism

Following steps are used

1) For adjust Pair in the array do

if the current pair of the element is not in ascending order than exchange the two element. other wise skeep the exchanging

by repeted exchange method with each pass the data at one position is sorted since there are n element in the data Implies that n-1 passes must be made through the array to complet the sort

The algorithm discription is as Follows

1) establish the array a[1...n] for n element.

2) While there are still element not sorted do

a) set the order indicator Stored to true

b) For all adjust pairs of the element in the unsorted

Part of the array do

b.i) if Current adjust pair is not in desending order then exchange the elements in pair

b.ii) set order to False

3) Return the sorted order

30	12	18	8	14	41	3	39

12	18	8	14	30	3	39	41

i=1

12	8	14	3	30	39	41

i=2

8	12	14	3	30	39	41

i=3