

Data Structures
Data Structures and Algorithms
Spring-2020 Mid-Semester Assignment
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- Attempt All Tasks.

Q#1. (a) Let the size of A [] be 15654 and the lower bound be 36767, calculate the upper bound. (06)

- (b) Suppose a list of 350 elements is to be sorted using Bubble Sort, then find
- i. Total Number of Passes (01)
 - ii. Total Number of Steps (01)
 - iii. Number of Steps in Pass# 137 (01)
 - iv. Number of Steps in Pass# 193 (01)

Q#2. Sort the given list using Selection Sort. (10)
10, 15, 0, 7, 8, 6

Q#3. Fill in the blanks. (10)

- i. _____ Data Structure may deal with only a single value.
- ii. _____ Data Structure may deal with multiple values.
- iii. The logical / mathematical organization of data is called _____.
- iv. A Tree is a _____ Data Structure.
- v. An Array is a _____ Data Structure.
- vi. List must be sorted for _____ Searching.
- vii. $17 \text{ int-div } 2 =$ _____.
- viii. An investigation parade of criminals is an example of _____.
- ix. Number of Fields in a Record is called _____.
- x. Number of Records in a Block is called _____.

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(1)

Q.1

a) Let the size of $A[]$ be 15654 & the lower bound be 36767, calculate the upper bound.

Given

Size of $A[]$ is 15654

lower bound (lb) = 36767

upper bound (ub) = ?

Solution

As formula is:

$$\text{Size of } A[] = \text{ub} - \text{lb} + 1$$

$$15654 = \text{ub} - 36767 + 1$$

$$15654 = \text{ub} - 36768$$

OR

$$\text{ub} = 15654 + 36768$$

$$\boxed{\text{ub} = 52420}$$

Q.1

(2)

b) Suppose of a list 350 elements is to be sorted using bubble sort, Then find

i) Total number of passes

ii) Total number of steps

iii) Number of steps in pass # 137

iv) Number of steps in pass # 193

List of elements = 350 = n

i) total Number of passes = $n-1$

$$= 350-1$$

$$\boxed{= 349}$$

ii) Total Number of Steps = $\frac{n(n-1)}{2}$

$$= \frac{350(350-1)}{2}$$

$$= \frac{350(349)}{2}$$

$$= \frac{122150}{2}$$

$$\boxed{= 61075}$$

(3)

iii) Number of steps in pass # 137:

n - pass number

$$350 - 137$$

$$\boxed{213}$$

iv) Number of steps in 193 pass:

n - pass number

$$350 - 193$$

$$\boxed{157}$$

(4)

Q.2:-

Sort the given list using selection sort

10, 15, 0, 7, 8, 6

Selection Sort

$$n = 6$$

$$\text{Steps} = n - 1 \Rightarrow 6 - 1 \\ = 5$$

Step#1 Element = 10

10, 15, 0, 7, 8, 6

0, 15, 10, 7, 8, 6

Step#02 Element = 15

0, 15, 10, 7, 8, 6

0, 6, 10, 7, 8, 15

Step#3 Element = 7

0, 6, 10, 7, 8, 15

0, 6, 7, 10, 8, 15

Step#4 Element = 8

0, 6, 7, 10, 8, 15

0, 6, 7, 8, 10, 15

(5)

Step#05 Element ~~10~~ = 10

0, 6, 7, 8, 10, 15 \therefore 10 is at proper position

0, 6, 7, 8, 10, 15

List is sorted

Q#3 Fill in the blanks.

- i) Simple Data structure may deal with only a single value
- ii) linklist Data structure may deal with multiple value
- iii) The logical/mathematical organization of dat is called Data Structure
- iv) A Tree is a Non linear Data structure.
- v) An Array is a linear Data structure.
- vi) List must be sorted for Binary searching
- vii) $17 \text{ int-div } 2 = 8$
- viii) A investigation grade of criminals is an example of Linear Search.
- ix) Number of fields in Record is called Row
- x) Number of Records in block is called Blocking factor.