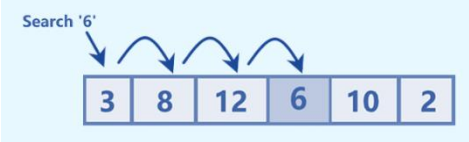
DATA STRUCTURE

SEMSTER - 2ND **ASSIGNMENT - 3** **COURSE - BSC – IT**

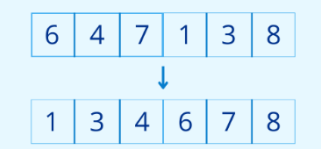
1. **What is searching?**

Ans - Searching is the process of finding a specific element in a collection of data.



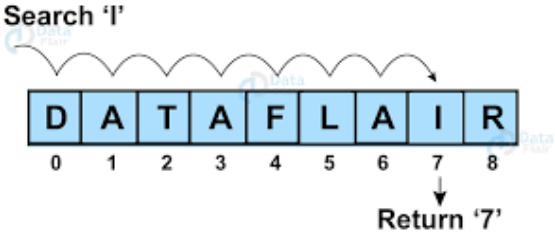
2. **What is sorting?**

Ans - Sorting is the process of arranging data elements in a particular order, typically in ascending or descending order.



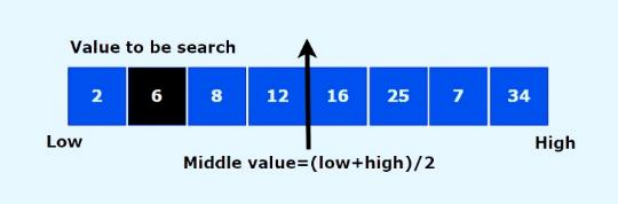
3. **What is sequential search?**

Ans - Sequential search, also known as linear search, is a simple searching algorithm that checks each element in a collection one by one until the target element is found or the end of the collection is reached.



4. **What is Binary search**

Ans - Binary search is a searching algorithm that works on sorted arrays. It repeatedly divides the search interval in half until the target element is found or the search interval is empty.



5. **Differentiate between searching and sorting**

Ans –

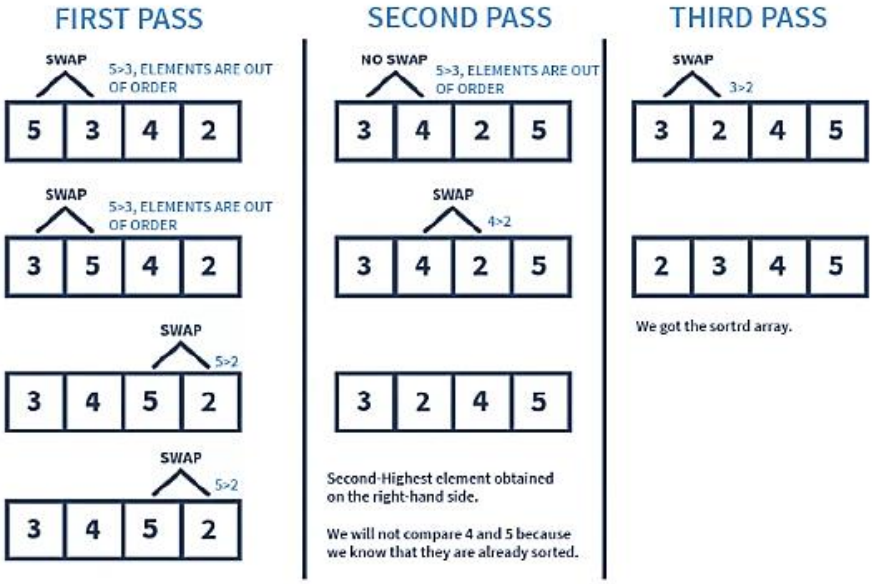
Aspect	Searching	Sorting
Objective	Find a value	Arrange values
Focus	Finding	Ordering
Applicability	Works on any data	Requires sorting
Algorithms	Sequential, Binary	Bubble, Quick, Merge

6. **Write an algorithm to sort the elements using bubble sort.**

Ans –

- traverse from left and compare adjacent elements and the higher one is placed at right side.
- In this way, the largest element is moved to the rightmost end at first.
- This process is then continued to find the second largest and place it and so on until the data is sorted.

Example:



7. **Write the steps to sort the given elements using Selection sort.**
   55, 23, 12, 52, 60, 70, 45, 40, 11, 25

Ans - Here is a step-by-step representation of the Selection Sort algorithm for the given array **[55, 23, 12, 52, 60, 70, 45, 40, 11, 25]:**

Step 1:

55	**23**	**12**	**52**	**60**	**70**	**45**	**40**	**11**	**25**
0	1	2	3	4	5	6	7	8	9

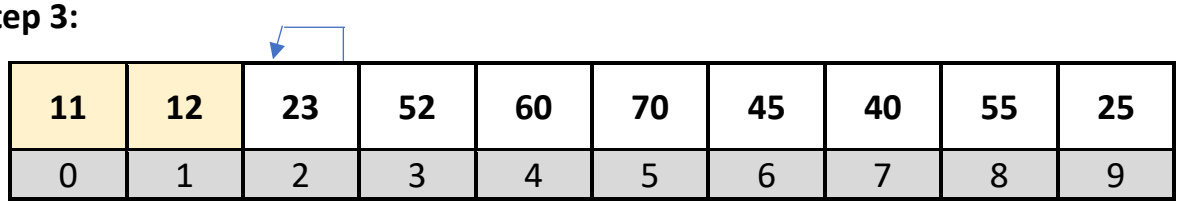
Find the smallest element (11) and swap it with the Zero element.

Step 2:

11	**23**	**12**	**52**	**60**	**70**	**45**	**40**	**55**	**25**
0	1	2	3	4	5	6	7	8	9

Find the smallest element in (12) and swap it with the first element.

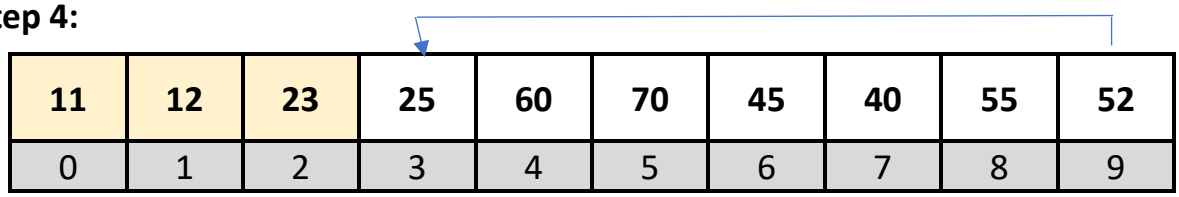
Step 3:



11	12	23	52	60	70	45	40	55	25
0	1	2	3	4	5	6	7	8	9

Find the smallest element in (23) and swap it with the second element.

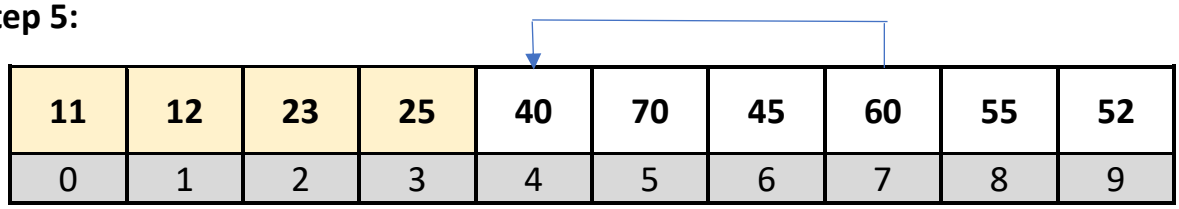
Step 4:



11	12	23	25	60	70	45	40	55	52
0	1	2	3	4	5	6	7	8	9

Find the smallest element (25) and swap it with the third element

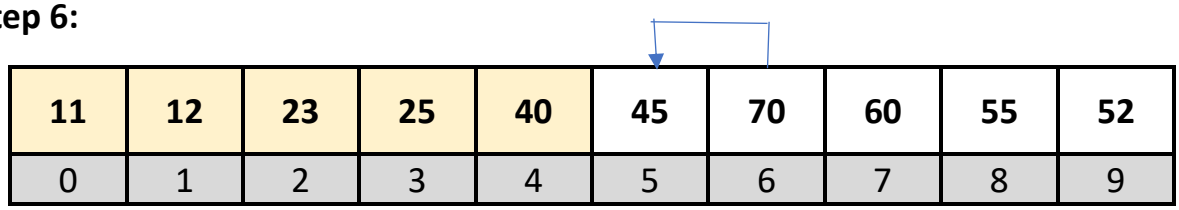
Step 5:



11	12	23	25	40	70	45	60	55	52
0	1	2	3	4	5	6	7	8	9

Find the smallest element in (40) and swap it with the fourth element.

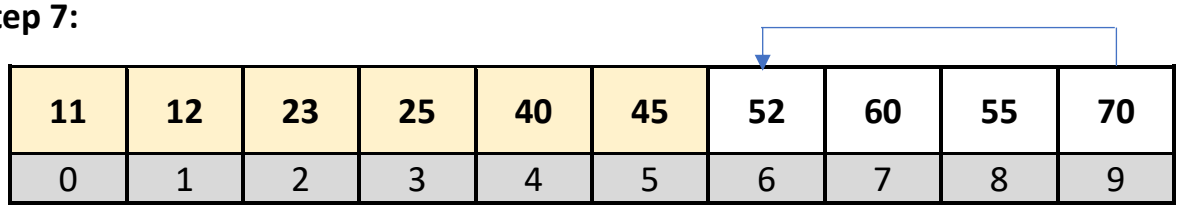
Step 6:



11	12	23	25	40	45	70	60	55	52
0	1	2	3	4	5	6	7	8	9

Find the smallest element in (45) and swap it with the fifth element.

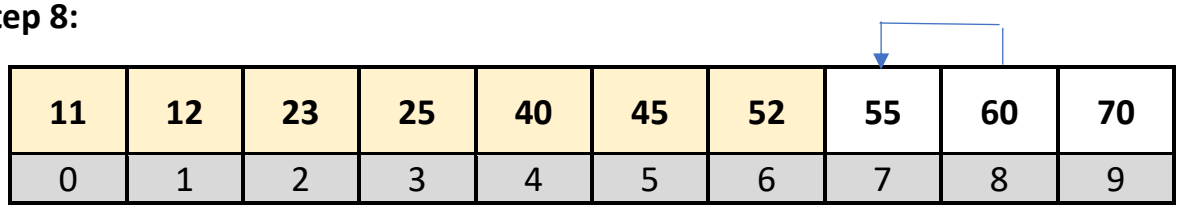
Step 7:



11	12	23	25	40	45	52	60	55	70
0	1	2	3	4	5	6	7	8	9

Find the smallest element in (52) and swap it with the sixth element.

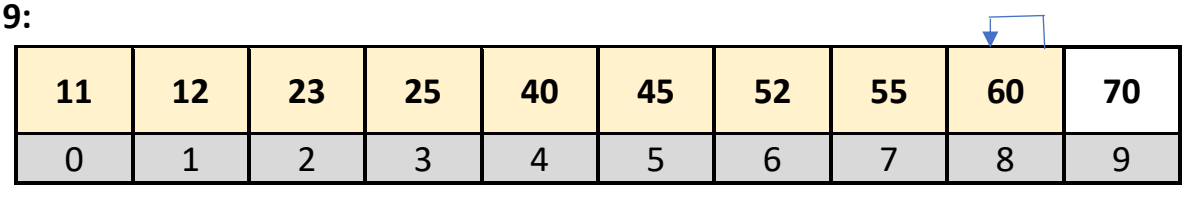
Step 8:



11	12	23	25	40	45	52	55	60	70
0	1	2	3	4	5	6	7	8	9

Find the smallest element in (55) and swap it with the seventh element.

Step 9:



11	12	23	25	40	45	52	55	60	70
0	1	2	3	4	5	6	7	8	9

Find the smallest element in (60) and swap it with the eighth element.

Step 10:

11	12	23	25	40	45	52	55	60	70
0	1	2	3	4	5	6	7	8	9

No swap needed as the last element is already in its correct position.

8. **Write the steps to search an element 34 using binary search in the given list 12,14,16,17,23,27,34,45,47,50,67,72,82,91**

Ans - **Start** **Middle** **End**

0	1	2	3	4	5	6	7	8	9	10	11	12	13
12	14	16	17	23	27	34	45	47	50	67	72	82	91

- Steps for Searching Element **34**
- Given sorted list: **[12, 14, 16, 17, 23, 27, 34, 45, 47, 50, 67, 72, 82, 91]**
- Start with the entire list.
- **Calculate the middle index:**

$$\frac{0+13}{2} = 6$$

- Compare the middle element list **[6]** with the target elem**ent 34:**

0	1	2	3	4	5	6	7	8	9	10	11	12	13
12	14	16	17	23	27	34	45	47	50	67	72	82	91

- List **[6] = 34**
- Since **34** matches the target element**,** the search is **successful.** Return the index **6.**

9. **Write the steps to sort the given elements using Insertion sort.**
   12, 32, 43, 15, 34, 65, 76, 60, 20, 39, 50, 10

Ans -

12	32	43	15	34	65	76	60	20	39	50	10
0	1	2	3	4	5	6	7	8	9	10	11

Start with the second element (32).

12	32	43	15	34	65	76	60	20	39	50	10
0	1	2	3	4	5	6	7	8	9	10	11

Insert 32 into its correct position among the already sorted elements

12	32	43	15	34	65	76	60	20	39	50	10
0	1	2	3	4	5	6	7	8	9	10	11

Insert 43 into its correct position among the already sorted elements

12	15	32	43	34	65	76	60	20	39	50	10
0	1	2	3	4	5	6	7	8	9	10	11

Insert 15 into its correct position among the already sorted elements

12	15	32	34	43	65	76	60	20	39	50	10
0	1	2	3	4	5	6	7	8	9	10	11

Insert 34 into its correct position among the already sorted elements

12	15	20	34	32	43	65	76	60	39	50	10
0	1	2	3	4	5	6	7	8	9	10	11

Insert 20 into its correct position among the already sorted elements

12	15	20	32	34	39	43	65	76	60	50	10
0	1	2	3	4	5	6	7	8	9	10	11

Insert 39 into its correct position among the already sorted elements

10	12	15	20	32	34	39	43	65	76	60	50
0	1	2	3	4	5	6	7	8	9	10	11

Insert 10 into its correct position among the already sorted elements

10	12	15	20	32	34	39	43	50	65	76	60
0	1	2	3	4	5	6	7	8	9	10	11

Insert 50 into its correct position among the already sorted elements

10	12	15	20	32	34	39	43	50	60	65	76
0	1	2	3	4	5	6	7	8	9	10	11

Insert 60 into its correct position among the already sorted elements

10	12	15	20	32	34	39	43	50	60	65	70
0	1	2	3	4	5	6	7	8	9	10	11

No changes needed as all elements are already sorted.

THANK YOU, CREATED BY SAURABH

All THE BEST

"हर कामयाबी की कहानी में,
एक कड़वा सच छुपा होता है।
वह है मेहनत और संघर्ष,
जिसे हर कोई नहीं समझ पाता है।"