LINEAR / SEQUENTIAL SEARCH

Define Linear Search

Steps to be followed to implement the linear / Sequential search

Algorithm

Example

Linear / Sequential Search

Linear search is also called as **sequential search algorithm.** It is the simplest searching algorithm. In Linear search, we simply traverse the list completely and match each element of the list with the item whose location is to be found. If the match is found, then the location of the item is returned; otherwise, the algorithm returns NULL.

It is the simplest of all the searching techniques which **does not** expect the specific ordering of data.
Sequential search is nothing but searching **an element / record in a linear way**. This can be in **arrays** or in **linked lists**.

Linear search algorithm finds a given element on a list of elements with **O(n)** time complexity where **n** is the total number of elements in the lists. Start the search from the beginning by comparing the **'key'** in each case and by scanning all the elements one by one until the end of the array or the linked list. If search is **successful**, the entire record of that particular **'key'** or the index of the record or the pointer to the record is returned. If the search is **unsuccessful**, it gives a failure notification **'-1'** is returned.

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Linear search is implemented using the following steps

Step 1: Read the search element (key).

Step 2: Compare the search element with the first element in the list.

Step 3: If **both** are **matched,** then display **search element is found** and terminate the function.

Step 4: If **both** are **not matched,** then compare search element with the next element in the list

Step 5: Repeat the **Steps 3 & 4** until the search element is compared with the last element in the list.

Step 6: If the last element in the list **does not match,** then display **element not found** and terminate the function.

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Algorithm: Linear Search

Algorithm: Linear Search (list [ ], n, key)

Let list [ ] be a linear array with **n** elements and **key** is an element to be searched in the list

```
Step 1: Set i = 0

Step 2: while (i < n) do

            If list [i] == key then

           return i;         //Key found at $i^{th}$ location

           end while

Step 3: return -1;      //key not found
```

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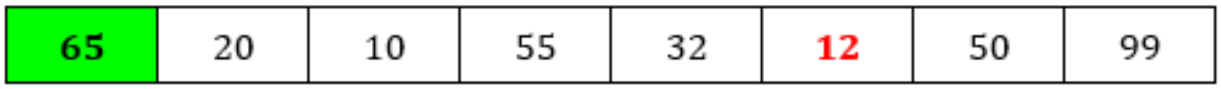
Example - Linear Search

Consider the following list of elements and element to be searched:

Search element (Key): **12**

Step 1: Search element **12** is compared with the first element **65**



Both are **not matching,** so move to the next element.

Step 2: Search element **12** is compared with the next element **20**

65	**20**	10	55	32	**12**	50	99

Both are **not matching,** so move to the next element.

Step 3: Search element **12** is compared with the next element **10**

65	20	**10**	55	32	**12**	50	99

Both are **not matching,** so move to the next element.

Step 4: Search element **12** is compared with the next element **55**

65	20	10	**55**	32	**12**	50	99

Both are **not matching,** so move to the next element.

Step 5: Search element **12** is compared with the next element **32**

65	20	10	55	**32**	**12**	50	99

Both are **not matching,** so move to the next element.

Step 6: Search element **12** is compared with the next element **12**

0	1	2	3	4	5	6	7
65	20	10	55	32	**12**	50	99

Both are **matching,** so move to the next element. Terminate the function and display the element found at index **‘5’.**