

ARRAYS

An array is a collection of items stored at contiguous memory locations. Its purpose is to hold multiple items of the same type together, simplifying the process of locating each element by adding an offset to a base value.

Array Index: In an array, elements are identified by their indexes. Array index starts from 0.

Array element: Elements are items stored in an array and can be accessed by their index.

Array Length: The length of an array is determined by the number of elements it can contain.

Types of arrays:

There are majorly two types of arrays:

- One dimensional array
- Two-dimensional array

One-dimensional

0	1	2	3	← Index
5	11	14	30	← Elements

Two Dimensional

Col →	0	1	
0	21	14	Row ↓
1	10	5	

Types of Array operations:

- Traversal: Traverse through the elements of an array.
- Insertion: Inserting a new element in an array.
- Deletion: Deleting element from the array.
- Searching: Search for an element in the array.
- Sorting: Maintaining the order of elements in the array.

Advantages of Arrays:

Arrays allow quick access to elements by their position, making retrieval faster.

Arrays have efficient cache usage, enhancing performance significantly.

With arrays, multiple data items of the same type can be represented using a single name.

Arrays provide a convenient way to store similar data types under one name.

Array structures are fundamental for implementing various data structures like linked lists, stacks, queues, trees, and graphs.

Disadvantages of Arrays:

Arrays have a fixed size, meaning their memory allocation cannot be changed once set. This limitation, known as a static array, prevents storing additional data when needed.

Allocating less memory than required for an array results in data loss.

Arrays are homogeneous, meaning they can't store different data types within a single array.

Implementing deletion and insertion operations in arrays is challenging due to their contiguous memory allocation. This difficulty is addressed by using data structures like linked lists, allowing for sequential element access.