

Array Cheatsheet

Arrays

Arrays hold values of the same type at contiguous memory locations. In an array, we're usually concerned about two things - the position/index of an element and the element itself.

Advantages

- Store multiple elements of the same type with one single variable name
- Accessing elements is fast ($O(1)$) as long as you have the index, as opposed to linked lists where you have to traverse from the head ($O(n)$).

Disadvantages

- Addition and removal of elements in the middle of an array is slow ($O(n)$) because the remaining elements need to be shifted to accommodate the new/missing element.
 - An exception to this is if the position to be inserted/removed is at the end of the array ($O(1)$).
- It cannot alter its size after initialization.
 - If an insertion causes the total number of elements to exceed the size, a new array has to be allocated and the existing elements have to be copied over.
 - The act of creating a new array and transferring elements over takes $O(n)$ time.

Common terms

- Subarray - A range of contiguous values within an array.
 - Example: given an array `[2, 3, 6, 1, 5, 4]`, `[3, 6, 1]` is a subarray while `[3, 1, 5]` is not a subarray.
- Subsequence - A sequence that can be derived from the given sequence by deleting some or no elements without changing the order of the remaining elements.
 - Example: given an array `[2, 3, 6, 1, 5, 4]`, `[3, 1, 5]` is a subsequence but `[3, 5, 1]` is not a subsequence.

Things to look out for during interviews

- Clarify if there are duplicate values in the array. Would the presence of duplicate values affect the answer? Does it make the question simpler or harder?

- When using an index to iterate through array elements, be careful not to go out of bounds.
- Be mindful about slicing or concatenating arrays in your code. Typically, slicing and concatenating arrays would take $O(n)$ time. Use start and end indices to demarcate a subarray/range where possible.

Corner Cases

- Empty sequence
- Sequence with 1 or 2 elements
- Sequence with repeated elements
- Duplicated values in the sequence

Time Complexity

Operation	Big-O	Note
Access	$O(1)$	
Search	$O(n)$	
Search (sorted array)	$O(\log(n))$	
Insert	$O(n)$	Insertion would require shifting all the subsequent elements to the right by one and that takes $O(n)$
Insert (at the end)	$O(1)$	Special case of insertion where no other element needs to be shifted
Remove	$O(n)$	Removal would require shifting all the subsequent elements to the left by one and that takes $O(n)$
Remove (at the end)	$O(1)$	Special case of removal where no other element needs to be

Resource

[Array in Data Structure: What is, Arrays Operations \[Examples\]](#)

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