Understanding
Array, Map, Two pointer, Set

Cracking Coding Interview @ Ostad
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Array

An array is a collection of elements identified by index or key

Characteristics:

- Fixed Size
- Indexed Access
- Homogeneous Elements

Example:

```
arr = [1, 2, 3, 4, 5]
```

Array (Continued)

Operations:

- Access: O(1)
- Insertion: O(n)
- Deletion: O(n)

Use Cases:

- Storing multiple items of the same type
- Iterating through elements
- Efficient indexing

Maps

A map (or dictionary) is a collection of key-value pairs.

Characteristics:

- Unordered Collection
- Unique Keys
- Fast Lookups

Example:

```
map = {'name': 'Ostad', 'country': 'Bangladesh'}
```

Maps (Continued)

Operations:

- Access: O(1)
- Insertion: O(1)
- Deletion: O(1)

Use Cases:

- Associative arrays
- Fast lookups by key
- Storing complex data structures

Two-Pointer Technique

A technique used to solve problems involving arrays or linked lists by using two pointers to iterate.

Types:

- Left and Right Pointers
- Slow and Fast Pointers

Example:

- Sliding window problem
- Floyd's Cycle Detection algorithm

Set

A set is a collection of unique elements.

Characteristics:

- Unordered
- No Duplicate Elements

Example:

```
s = {1, 2, 3, 4, 5}
s.add(6)
print(s)  # Output: {1, 2, 3, 4, 5, 6}
```

Set (Continued)

Operations:

- Access: O(1)
- Insertion: O(1)
- Deletion: O(1)

Use Cases:

- Membership Testing
- Removing Duplicates
- Set Operations (Union, Intersection)