Concept

Cyclic sort:

Cyclic Sort is a simple and efficient in-place sorting algorithm that works for arrays containing distinct integers within a specified range. It is called "Cyclic Sort" because it iterates through the array cyclically to place each element in its correct position. The key idea behind Cyclic Sort is that each element in the array should be at the index equal to its value minus one (assuming 0-based indexing). By iteratively swapping elements until they are in their correct positions, we can achieve a sorted array efficiently.

Practical Applications of Cyclic Sort

1. Sorting data streams: Real-time applications often receive continuous streams of data that need to be sorted efficiently. Cyclic Sort can be used to sort incoming data in real-time, ensuring that the data is processed and presented in the desired order.

2. Event processing: Real-time event processing systems often deal with a high volume of events arriving in a non-sequential order. Cyclic Sort can be applied to sort the events based on timestamps or other criteria, allowing for efficient event processing and analysis.

3. Real-time analytics: In real-time analytics systems, data needs to be sorted and aggregated continuously to generate meaningful insights. Cyclic Sort can be used to sort data points based on specific dimensions or keys, enabling real-time data analysis and visualization.

4. Resource allocation: Real-time software systems that handle resource allocation may require sorting of resources based on availability, priority, or other factors. Cyclic Sort can help arrange resources in the desired order, allowing efficient allocation and utilization.

5. Time-based scheduling: Real-time scheduling systems often involve sorting tasks or events based on their scheduled times. Cyclic Sort can be used to order tasks, ensuring they are executed in the correct sequence according to their scheduled times.

6. Real-time messaging: Real-time messaging systems may receive messages from multiple sources and need to display them in the correct order. Cyclic Sort can be applied to sort incoming messages based on timestamps or sequence numbers, ensuring they are displayed chronologically.

Questions of Cyclic Sort

Quo 1:- Find the Missing Number (easy)

Missing in Array

You are given an array **arr[]** of size n - 1 that contains **distinct integers** in the range from 1 to n (inclusive). This array represents a permutation of the integers from 1 to n with one element missing. Your task is to identify and return the missing element.

Examples:

Input: arr[] = [1, 2, 3, 5]

Output: 4

Explanation: All the numbers from 1 to 5 are present except 4.

Input: arr[] = [8, 2, 4, 5, 3, 7, 1]

Output: 6

Explanation: All the numbers from 1 to 8 are present except 6.

Input: arr[] = [1]

Output: 2

Explanation: Only 1 is present so the missing element is 2.

Constraints:
$1 \leq \text{arr.size()} \leq 10^6$
$1 \leq \text{arr[i]} \leq \text{arr.size()} + 1$

Solve this above example by using cyclic sort

You also solve with different technique