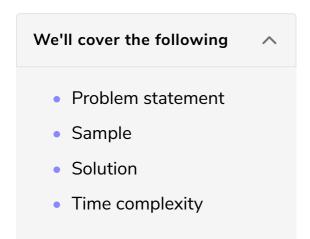
Solved Problem - Merge Sorted Arrays

In this lesson, we'll discuss how to merge two sorted arrays.



Problem statement

Given two sorted arrays, A[] and B[], of sizes N and M respectively, merge them into a single array of size N+M and print the array.

Input format

The first line consists of two space-separated integers N,M $(1 \leq N,M \leq 10^5)$.

The second line consists of N space-separated integers representing the array A[] $(1 \le A[i] \le 10^5)$.

The third line consists of M space-separated integers representing the array B[] $(1 \le B[i] \le 10^5)$.

Output format

Print a single line of output containing the N+M integers representing the merged and sorted array ${\cal C}[].$

Sample

Input:

Output

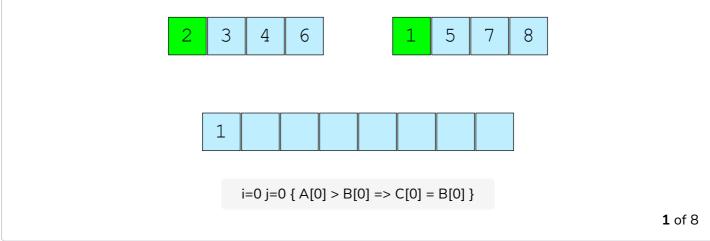
1 2 3 4 5 6 7 8

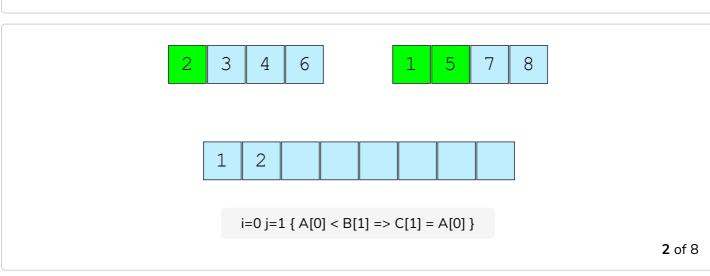
Solution

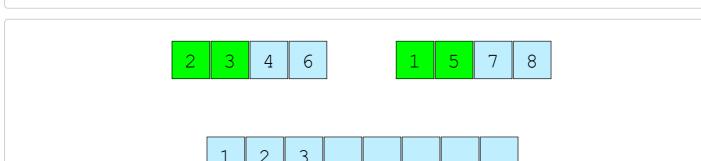
We use 2 pointers i and j for A[] and B[] respectively.

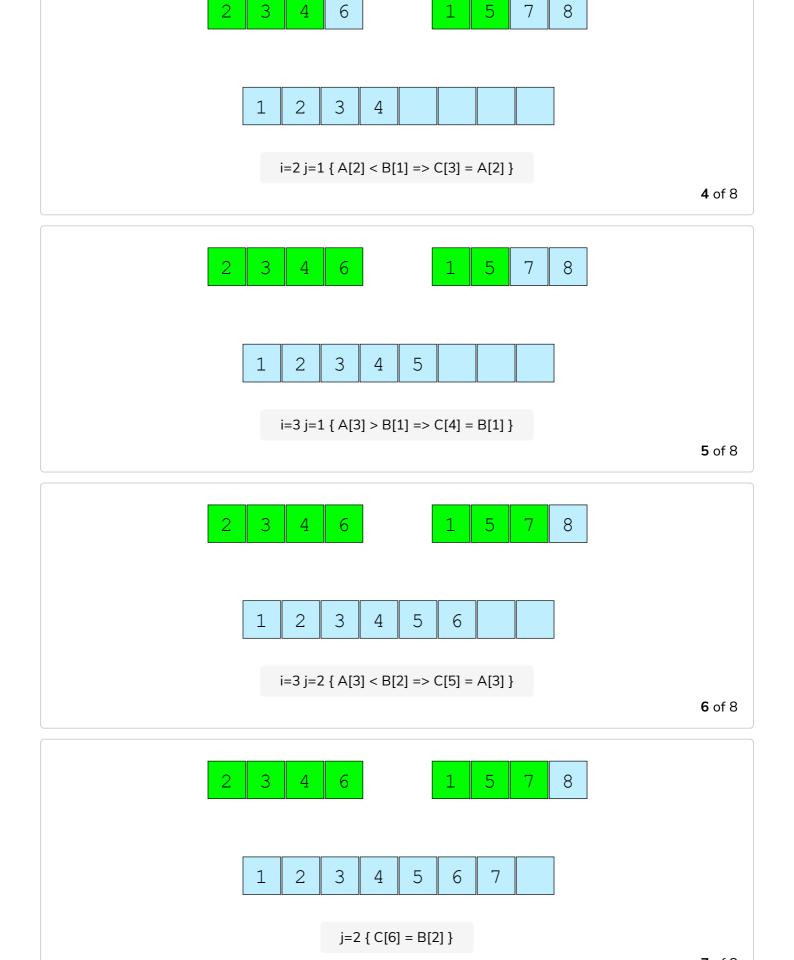
At each step, we copy the smaller of A[i], B[j] to the current end of C[]. Keep doing this until we reach the end of A or B. After that only one array remains (either A or B), copy all the remaining elements to C.

See the illustration for better understanding.



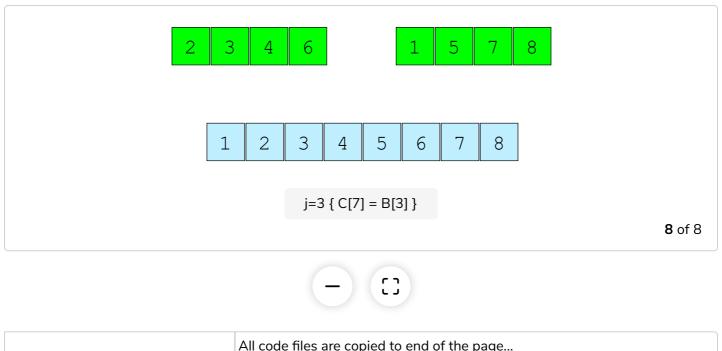


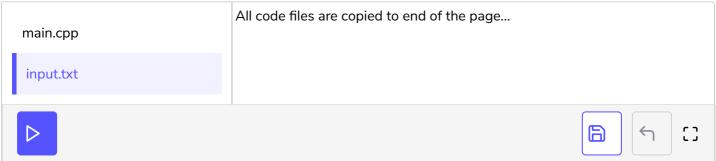




 $i=1 j=1 \{ A[1] < B[1] => C[2] = A[1] \}$

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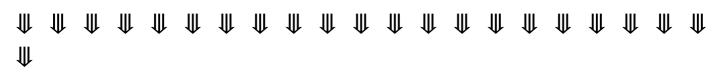


Time complexity

Since we iterate both the arrays exactly once, the time complexity of the solution is O(N+M).

In the next lesson, we'll discuss a very useful prefix-sum technique.

Code Files Content !!!



```
| main.cpp [1]
```

```
#include
using namespace std;
void merge(int A[], int B[], int C[], int N, int M) {
 int i = 0, j = 0, m = 0;
 while (i < N && j < M) \{
   if (A[i] < B[j])
     C[m++] = A[i++];
   else
     C[m++] = B[j++];
 }
 // one of A or B will exhaust first, we'll copy the remaining to C
 while (i < N) // B exhauseted
   C[m++] = A[i++];
 while (j < M) // A exhauseted
   C[m++] = B[j++];
}
int main() {
 ifstream cin("input.txt");
 int N, M;
 cin >> N >> M;
 int A[N], B[M], C[N + M];
 for (int i = 0; i < N; i++) cin >> A[i];
 for (int i = 0; i < M; i++) cin >> B[i];
 merge(A, B, C, N, M);
 for (int i = 0; i < N + M; i++)
   cout << C[i] <<" ";
 return 0;
}
input.txt [1]
      4 4
2 3 4 6
1 5 7 8
```

#TIICTUUE