Merge an array of size n into another array of size m+n

Asked by Binod

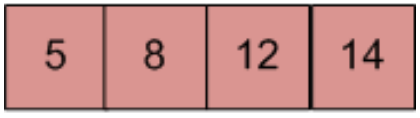
Question:

There are two sorted arrays. First one is of size m+n containing only m elements. Another one is of size n and contains n elements. Merge these two arrays into the first array of size m+n such that the output is sorted.

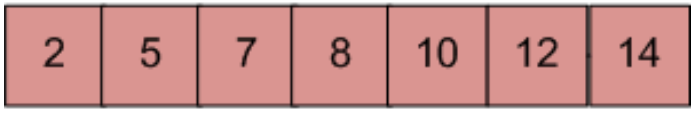
Input: array with m+n elements (mPlusN[]).

NA => Value is not filled/available in array mPlusN[]. There should be n such array blocks.

Input: array with n elements (N[]).



Output: N[] merged into mPlusN[] (Modified mPlusN[])



Algorithm:

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```
Let first array be mPlusN[] and other array be N[]
1) Move m elements of mPlusN[] to end.
2) Start from nth element of mPlusN[] and 0th element of N[] and merge them
    into mPlusN[].
```

Implementation:

```
#include <stdio.h>

/* Assuming -1 is filled for the places where element
   is not available */
#define NA -1

/* Function to move m elements at the end of array mPlusN[] */
void moveToEnd(int mPlusN[], int size)
{
  int i = 0, j = size - 1;
  for (i = size-1; i >= 0; i--)
    if (mPlusN[i] != NA)
    {
      mPlusN[j] = mPlusN[i];
      j--;
    }
}

/* Merges array N[] of size n into array mPlusN[]
   of size m+n*/
int merge(int mPlusN[], int N[], int m, int n)
{
  int i = n;  /* Current index of i/p part of mPlusN[]*/
  int j = 0; /* Current index of N[]*/
  int k = 0; /* Current index of of output mPlusN[]*/
  while (k < (m+n))
  {
    /* Take an element from mPlusN[] if
       a) value of the picked element is smaller and we have
          not reached end of it
       b) We have reached end of N[] */
    if ((i < (m+n) && mPlusN[i] <= N[j]) || (j == n))
    {
      mPlusN[k] = mPlusN[i];
      k++;
      i++;
    }
    else  // Otherwise take emenet from N[]
    {
```

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```
            mPlusN[k] = N[j];
            k++;
            j++;
        }
    }
}

/* Utility that prints out an array on a line */
void printArray(int arr[], int size)
{
  int i;
  for (i=0; i < size; i++)
    printf("%d ", arr[i]);

  printf("\n");
}

/* Driver function to test above functions */
int main()
{
  /* Initialize arrays */
  int mPlusN[] = {2, 8, NA, NA, NA, 13, NA, 15, 20};
  int N[] = {5, 7, 9, 25};
  int n = sizeof(N)/sizeof(N[0]);
  int m = sizeof(mPlusN)/sizeof(mPlusN[0]) - n;

  /*Move the m elements at the end of mPlusN*/
  moveToEnd(mPlusN, m+n);

  /*Merge N[] into mPlusN[] */
  merge(mPlusN, N, m, n);

  /* Print the resultant mPlusN */
  printArray(mPlusN, m+n);

  return 0;
}
```

Output:

```
2 5 7 8 9 13 15 20 25
```

Time Complexity: O(m+n)

Please write comment if you find any bug in the above program or a better way to solve the same

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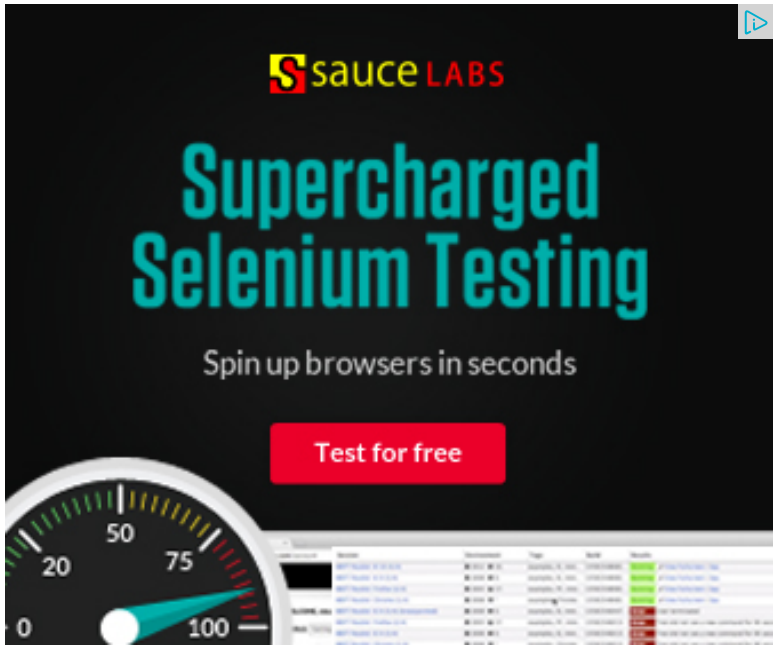
problem.



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Prakhar Jain • 8 days ago

This condition

if ((i < (m+n) && mPlusN[i] <= N[j]) || (j == n))

should be

if ((j == n) || (i < (m+n) && mPlusN[i] <= N[j]))

to avoid Indexing Out Of Array's limit in case j is actually n.

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Rohit Kumar • a month ago

```
#include <stdio.h>

#include <stdlib.h>

int main()

{

int a[4]={5,8,12,14};

int b[7]={2,'\0',7,'\0','\0','\0',10},i,n,m,j,k,c,cnt=0;

n=sizeof(a)/sizeof(int);
```

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m=sizeof(b)/sizeof(int);

c=m-1;

for(i=m-1;i>=0;i--)

{ k=i-1;

see more

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anonymus • 2 months ago

#include<stdio.h>

int valuetoinput(int*,int*);

static int j,k;

int main()

{

int a[]={2,4,5,8,9,-1,13,-1,-1,-1,22,-1,24,34};

int b[]={1,3,7,14,36};

int c[14]={0};

int l;

for(int i=0;i<14;i++)

{

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NAVEEN KUMAR • 3 months ago

```
#include <stdio.h>
#include <stdlib.h>

void merge_array(int a[], int b[],int size1, int size2)
{

int k;
k = size1 + size2;
int i;
int merged_array[k];

for(i = 0; i < size1; i++)
{
merged_array[i] = a[i];

}

for(i = 0; i < size2; i++)
{
```

see more

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Nikhil Ramteke • 9 months ago

Time complexity: O(m + n)
Spcae : O(1)

Easy Solution:

M_PLUS_N array = [2, NA, 7 NA, NA, 10, NA]
N array = [5, 8, 12, 14]

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(NA_Position = 1, Next_Numbers_Position = 3)

```
for(int i = 0; i < N.length(); i++){
        if(N[i] < M_PLUS_N[Next_Numbers_Position]){
                M_PLUS_N[NA_Position] = N[i];
                NA_Position = find_Next_NA(NA_POSITION);
        } else{
                // dont move forward i pointer on N array unless you
```

see more

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Nikhil Ramteke Nikhil Ramteke • 9 months ago

Sorry edit here:

instead of this:
(NA_Position = 1, Next_Numbers_Position = 3)

Wanted to write this:
(NA_Position = 1, Next_Numbers_Position = 2)

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shek8034 • 11 months ago

Suppose if m is very large, then it would be costly to move m elements.
We can use another temporary array (temp[m]) to store all the m elements of
Now merge the two arrays : arr2[n] and temp[m] into arr1[m+n] by the help of
above.
Space complexity : O(m).

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Your constant m is still large !! that's matter.. with algo said above :)

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Asap shek8034 • 10 months ago

Or we could compare element m-1 of mplusn arr with n-1 element of r
Space Complexity O(1)

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miandfdy • a year ago

Can we say Merging as:??

copy first array into result array
copy second array into result array
sort the final array
remove duplicates

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srikanthraju536 miandfdy • 10 months ago

@maindfdy: But for the sorting time complexity is more.

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Sai Nikhil • a year ago

why to do work after

> `j==n`

, can't we simply

> **`break`**

the

> **`while`**

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-

then?

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Kamlesh • 2 years ago

there shld b correction in:
void moveToEnd(int mPlusN[], int size)
{
int i = 0, j = size - 1;
for (i = size-1; i >= 0; i--)
if(mPlusN[i] != NA && mPlus[j]==NA)//because there can b element at (size-1
{
mPlusN[j] = mPlusN[i];
j--;
}
}

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WgpShashank • 3 years ago

Here is Java Implementation Hope It will Help

```
public class Merge
{

public static void main(String a[])
{

    merge(new in[]{1,3,4,6,7},5,new int[]{2,5,8,9,10},5);

}
```

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```
public static void merge(int[] a, int[] b, int n, int m)
{
 int k = m + n - 1; // Index of last location of array b
 int i = n - 1; // Index of last element in array b
 int j = m - 1; // Index of last element in array a
```

see more

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shek8034 ➦ WgpShashank • 10 months ago

Since you are not checking the NIL value, lets assume NIL as INT_MIN case. Check it out
MplusN[] = {2, NIL, 7, NIL, NIL, 20, NIL};
N[] = {5, 8, 12, 14};

According to your logic, 14 > NIL (INT_MIN), so it is placed in the end, v placed there.

So you must have to move the MplusN[] array. You can not do it by trav

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krishna ➦ WgpShashank • 2 years ago

How did u handle the array blocks with NA elements?

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sekhar • 3 years ago

Implementation in Java.....

```
public class MergeSortedArray {
	public static void main(String[] args) {

		int[] array1 = {-100,0,10,150};
```

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```
                int swapIndex = array1.length - 1;

                for(int j = 0, i = 0; j < array2.length - 1;) {
                if(j == array2.length - 1 || (array2[j] == 0)){
                //Copy the last element of array1 in to array2..
                                array2[j] = array1[i];
                                i++;
                                j++;
        }else if((array2[j] < array1[i]) && (array2[j] != 0)) {
                       j++;
        }
```

see more

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Sambasiva • 4 years ago

```
int merge(int M[], int N[], int m, int n)
{
   int k = m + n -1;
   m--, n--;

   while(n >= 0 && m >= 0)
      M[k--] = M[m] > N[n] ? M[m--] : N[n--];

   while(n >= 0)
      M[k--] = N[n--];

}
```

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Jatin • 4 years ago

Just a little correction, the while loop of merge function should not let k to reac

```
while(k < (m+n)){
   ...
}
```

else setting mPlusN[k] would throw the ArrayIndexOutOfBoundsException.

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Marsha Donna ➦ Jatin • 8 months ago

yea ur right..moderators please make the change

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GeeksforGeeks ➦ Marsha Donna • 8 months ago

Jatin & Marsha,

Thanks for pointing this out. We have updated the loop conditio

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abhimanu • 4 years ago

"moveToEnd(mPlusN, 9)" function is actually just copying the valid entries in n
initial m-n values are unchanged.
if mPlusN[] is 2 8 -1 -1 -1 13 -1 15 20, the o/p after executing "moveToEnd(mF
13 15 20. the intial m-n values are intact. This behavior of moveToEnd() functi
because all that matters is the last n values in mPlusN[] array.

If we at all want the initial values of mPlusN[] arra to be NA, the function could

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```
/* Function to move m elements at the end of array
   mPlusN[] */
void moveToEnd(int mPlusN[], int size)
{
  int i = 0, j = size - 1;
  int num_of_empty;
  for (i = size-1; i >= 0; i--)
    if(mPlusN[i] != NA)
    {
      mPlusN[j] = mPlusN[i];
```

see more

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Ujjwal abhimanu • a year ago

in moveToEnd(), we are simply copying the elements to end of array,i.
to avoid confusion, we can swap the elements instead of copying. By t
sorted array to the end..
what say guys.??

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