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

void swap(int *a, int *b)
{
    int temp = *a;
    *a = *b;
    *b = temp;
}

void printArray(int *arr, int size)
{
    for(int index = 0; index < size; index++)
        printf("%d\t", arr[index]);
}

void sortInWave(int *arr, int size)
{
    for(int index = 0; index < size; index += 2)
    {
        if(index > 0 && arr[index - 1] > arr[index])
            swap(&arr[index], &arr[index - 1]);

        if(index < size - 1 && arr[index] < arr[index+1])
            swap(&arr[index], &arr[index + 1]);
    }
}

int main()
{
    int *arr, size;
    printf("Enter number of elements in an array\n");
    scanf("%d", &size);

    //allocate memory for array
    arr = (int *) malloc(size * sizeof(int));

    for(int index = 0; index < size; index++)
        scanf("%d", &arr[index]);

    sortInWave(arr, size);

    printArray(arr, size);
}

```

Time complexity:  $O(n)$

Space complexity:  $O(1)$