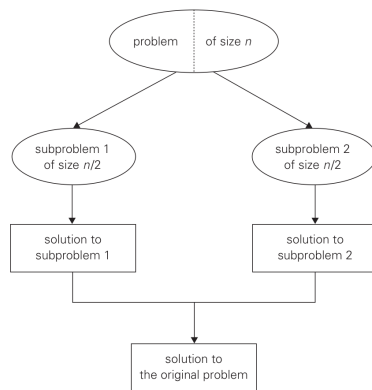


Divide-and-Conquer



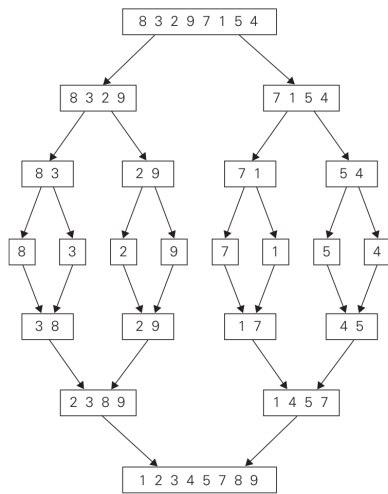
- General divide and conquer recurrence.

ALGORITHM *Mergesort*($A[0..n-1]$)
 //Sorts array $A[0..n-1]$ by recursive mergesort
 //Input: An array $A[0..n-1]$ of orderable elements
 //Output: Array $A[0..n-1]$ sorted in nondecreasing order
if $n > 1$
 copy $A[0..\lfloor n/2 \rfloor - 1]$ to $B[0..\lfloor n/2 \rfloor - 1]$
 copy $A[\lfloor n/2 \rfloor..n-1]$ to $C[0..\lfloor n/2 \rfloor - 1]$
 Mergesort($B[0..\lfloor n/2 \rfloor - 1]$)
 Mergesort($C[0..\lfloor n/2 \rfloor - 1]$)
 Merge(B, C, A) //see below

merge!

ALGORITHM *Merge*($B[0..p-1], C[0..q-1], A[0..p+q-1]$)
 //Merges two sorted arrays into one sorted array
 //Input: Arrays $B[0..p-1]$ and $C[0..q-1]$ both sorted
 //Output: Sorted array $A[0..p+q-1]$ of the elements of B and C
 $i \leftarrow 0; j \leftarrow 0; k \leftarrow 0$
while $i < p$ **and** $j < q$ **do**
 if $B[i] \leq C[j]$
 $A[k] \leftarrow B[i]; i \leftarrow i + 1$
 else $A[k] \leftarrow C[j]; j \leftarrow j + 1$
 $k \leftarrow k + 1$
if $i = p$
 copy $C[j..q-1]$ to $A[k..p+q-1]$
else copy $B[i..p-1]$ to $A[k..p+q-1]$

Example!



Efficiency: