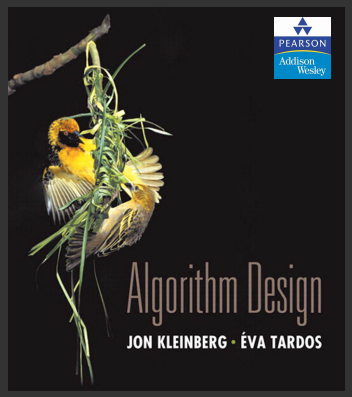


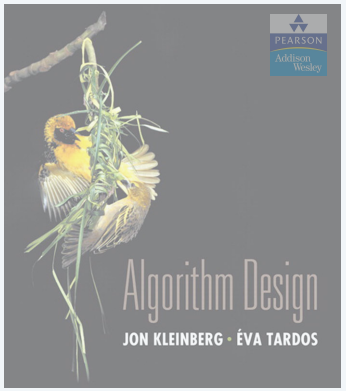
5. Divide and Conquer I

- *merge demo*
- *merge-and-count demo*

Lecture slides by Kevin Wayne

http://www.cs.princeton.edu/~wayne/kleinberg-tardos

Last updated on 3/5/18 2:24 PM



5. Divide and Conquer

- *merge demo*
- *merge-and-count demo*

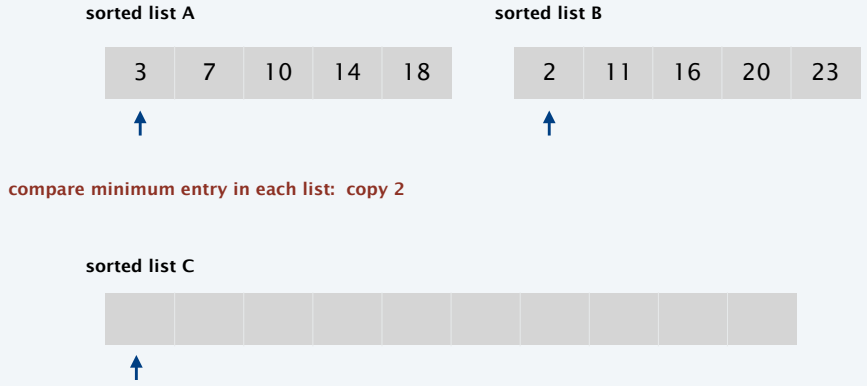
Sections 5.1–5.2

Merge demo

Given two sorted lists A and B, merge into sorted list C.

Merge demo

Given two sorted lists A and B, merge into sorted list C.



Merge demo

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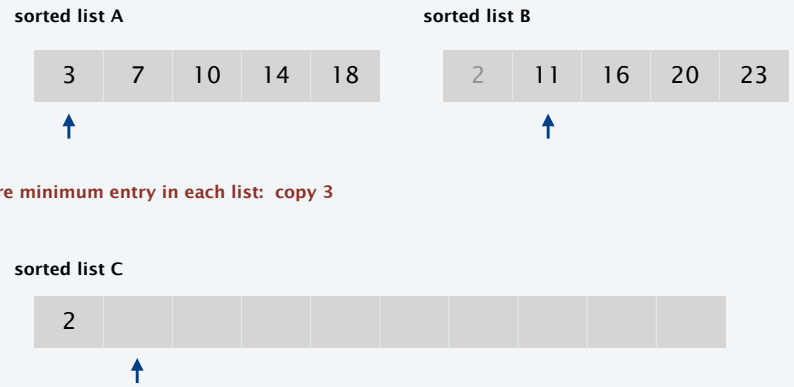

Merge demo

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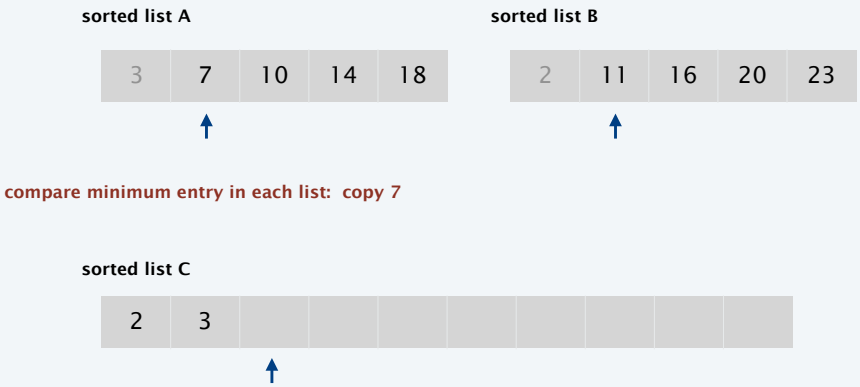
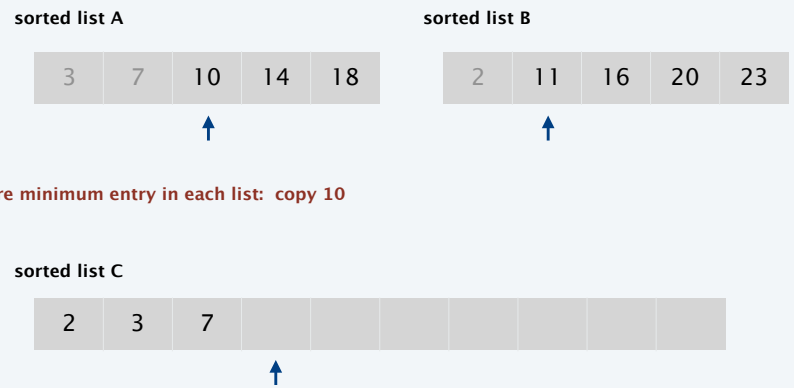


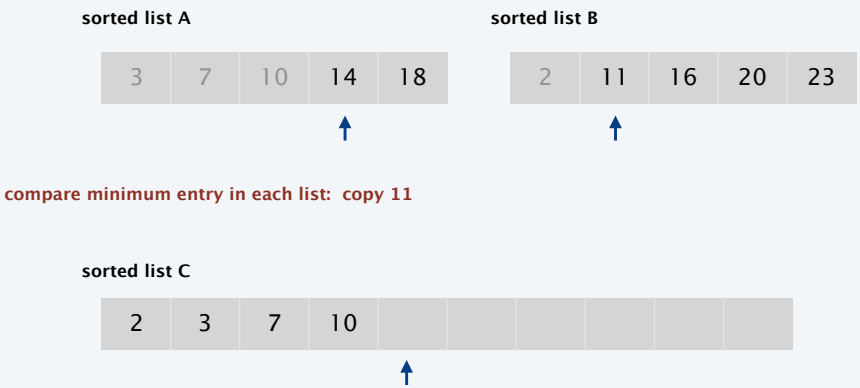
Merge demo

Given two sorted lists A and B, merge into sorted list C.



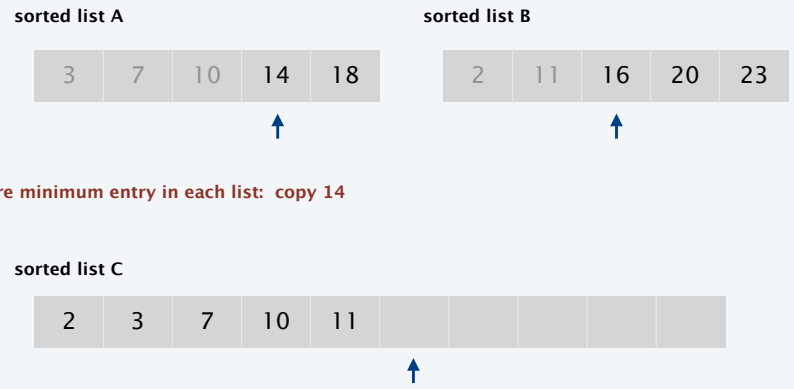
Merge demo

Given two sorted lists A and B, merge into sorted list C.



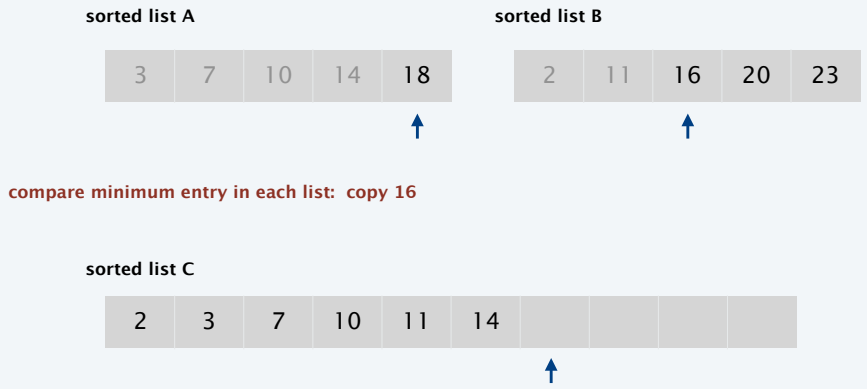
Merge demo

Given two sorted lists A and B, merge into sorted list C.



Merge demo

Given two sorted lists A and B, merge into sorted list C.



Merge demo

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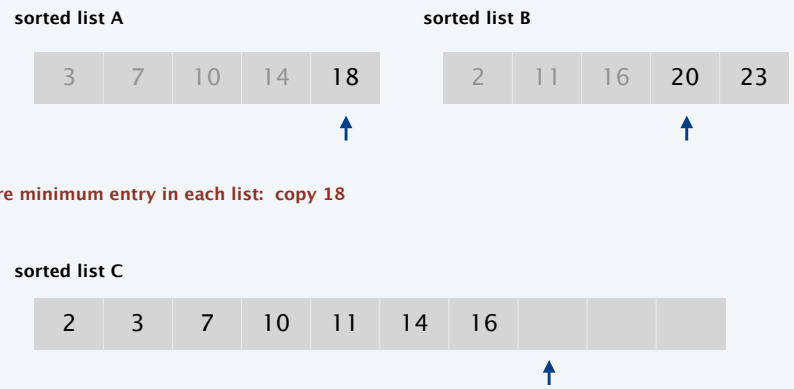
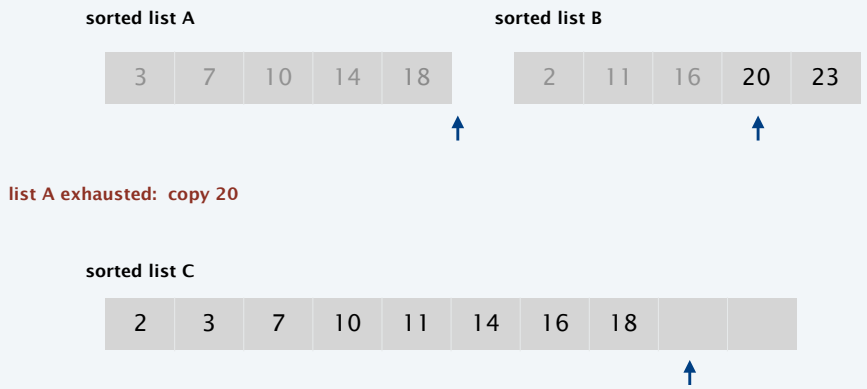


Merge demo

Given two sorted lists A and B, merge into sorted list C.



Merge demo

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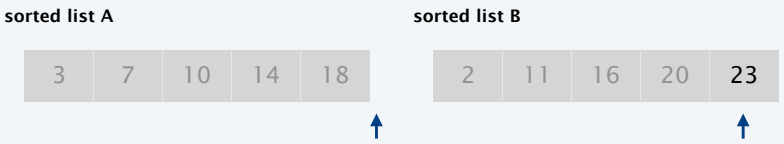
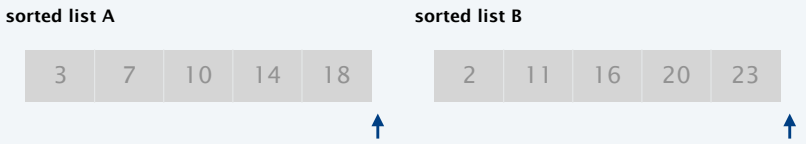


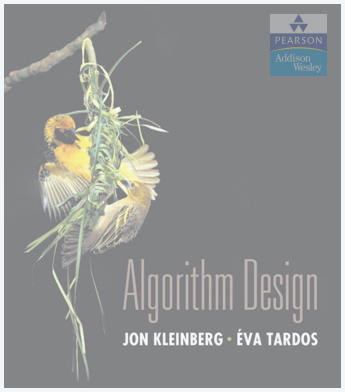
list A exhausted: copy 23

Merge demo

Given two sorted lists A and B, merge into sorted list C.



done



SECTION 5.3

5. DIVIDE AND CONQUER

- *merge demo*
- *merge-and-count demo*

Merge-and-count demo

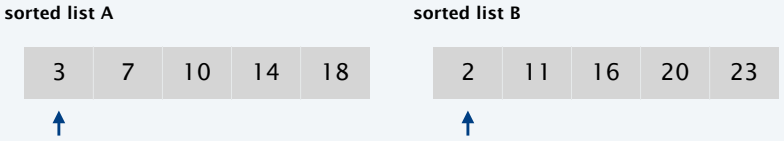
Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



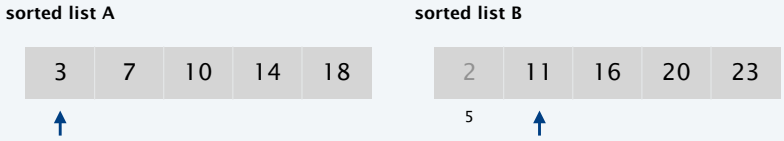
compare minimum entry in each list: copy 2 and add x to inversion count

x = 5 ← number of elements remaining in A
inversions = 0

Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



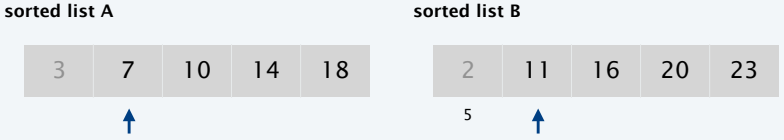
compare minimum entry in each list: copy 3 and decrement x

x = 5
inversions = 5

Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



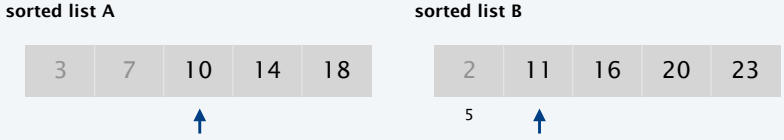
compare minimum entry in each list: copy 7 and decrement x

x = 4
inversions = 5

Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



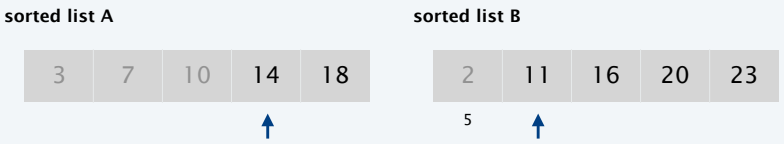
compare minimum entry in each list: copy 10 and decrement x

x = 3
inversions = 5

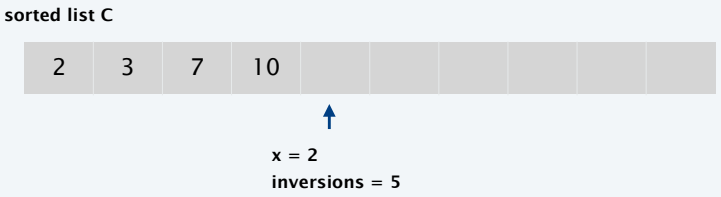
Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



compare minimum entry in each list: copy 11 and add x to increment count

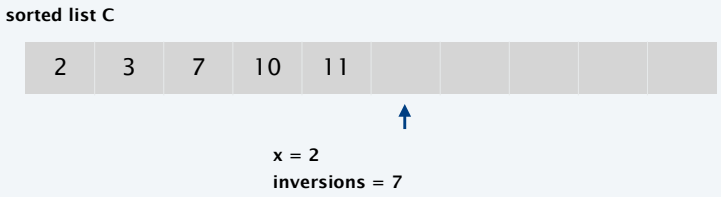


Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

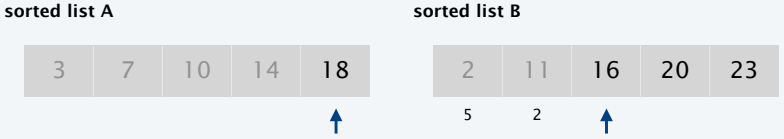
compare minimum entry in each list: copy 14 and decrement x



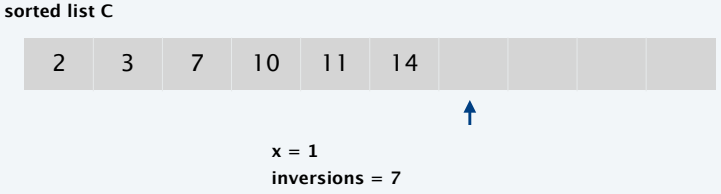
Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



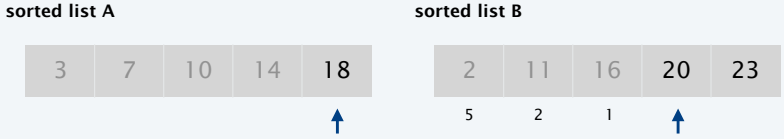
compare minimum entry in each list: copy 16 and add x to increment count



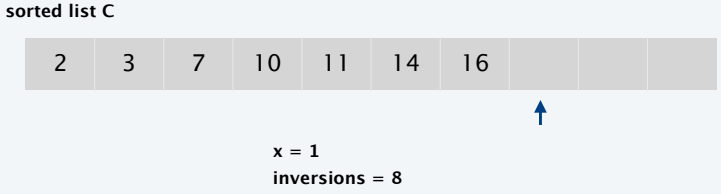
Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



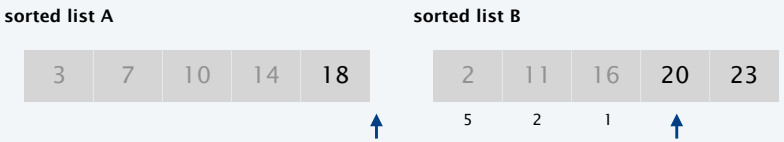
compare minimum entry in each list: copy 18 and decrement x



Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



list A exhausted: copy 20

x = 0
inversions = 8

Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

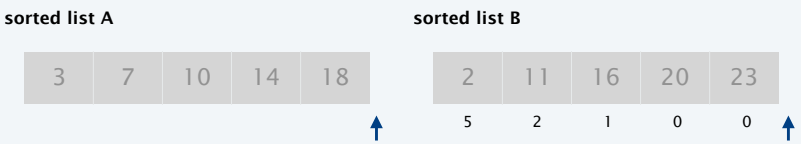
list A exhausted: copy 23

x = 0
inversions = 8

Merge-and-count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



done: return 8 inversions

x = 0
inversions = 8