

 POLITECNICO DI MILANO



Algoritmi e Strutture Dati

Laboratorio 06/10/2008

Primo Esercizio: Insertion Sort

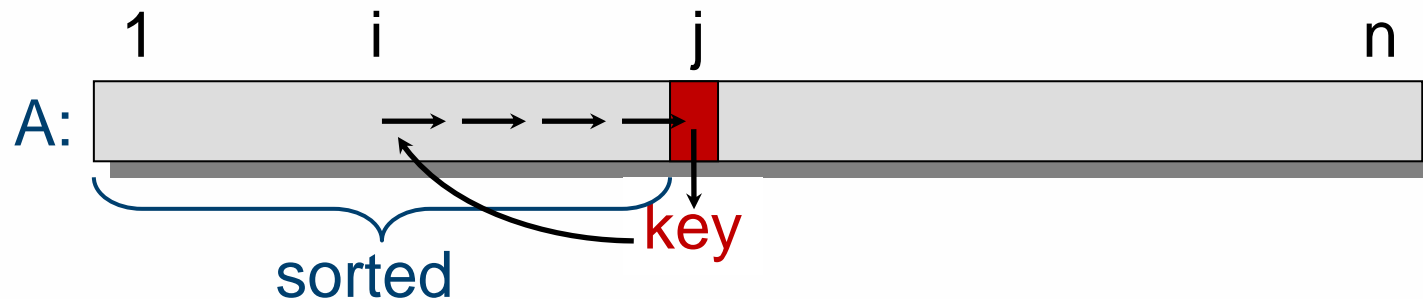
Ordiniamo l'array!

- ❑ Implementare una funzione:
void insertion_sort (int v[], int n);
- ❑ Inserirla tra la lettura e la scrittura dei dati

Insertion Sort

“pseudo codice”

```
INSERTION-SORT (A, n)
  for j ← 2 to n
    do key ← A[ j ]
      i ← j - 1
      while i > 0 and A[i] > key
        do A[i+1] ← A[i]
          i ← i - 1
      A[i+1] = key
```



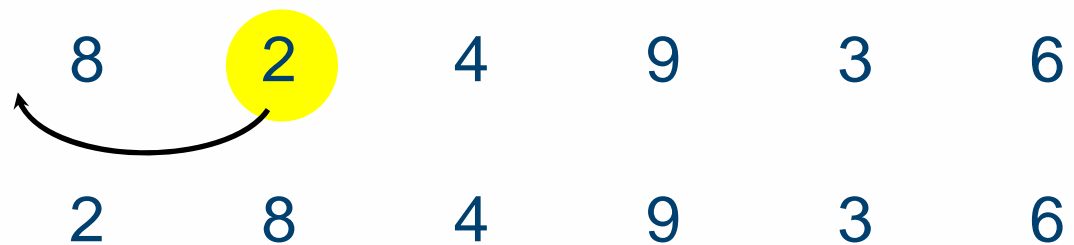
Esempio di Insertion Sort

8 2 4 9 3 6

Esempio di Insertion Sort



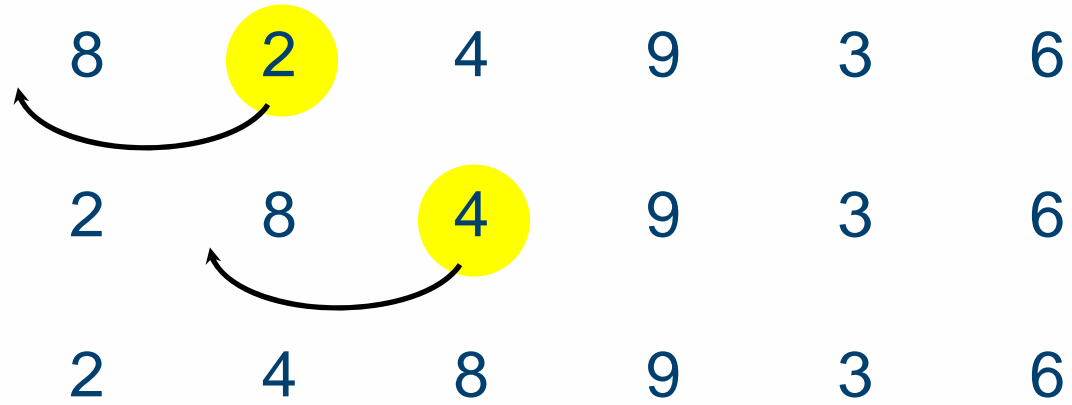
Esempio di Insertion Sort



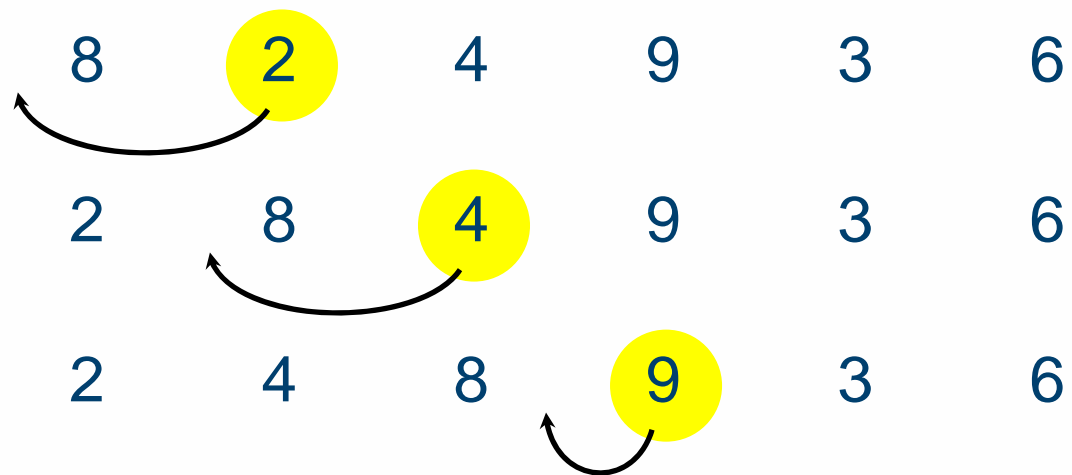
Esempio di Insertion Sort



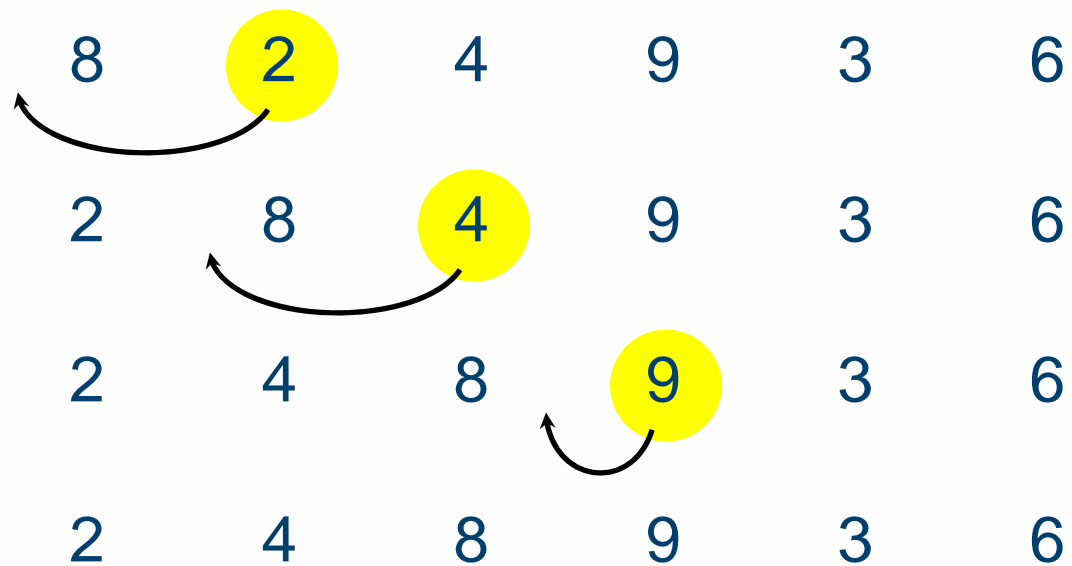
Esempio di Insertion Sort



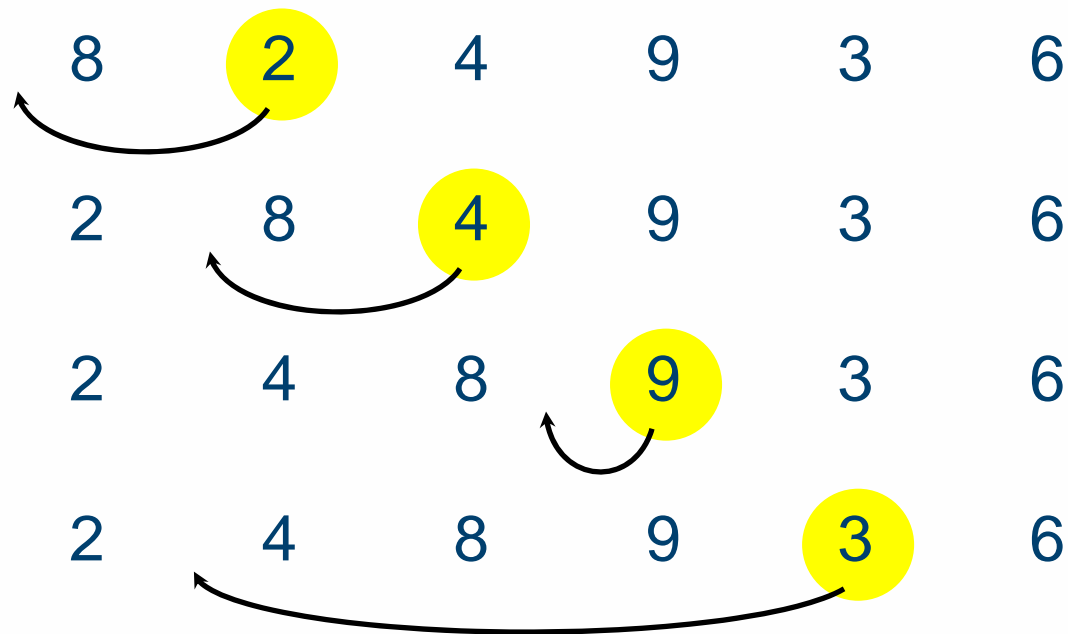
Esempio di Insertion Sort



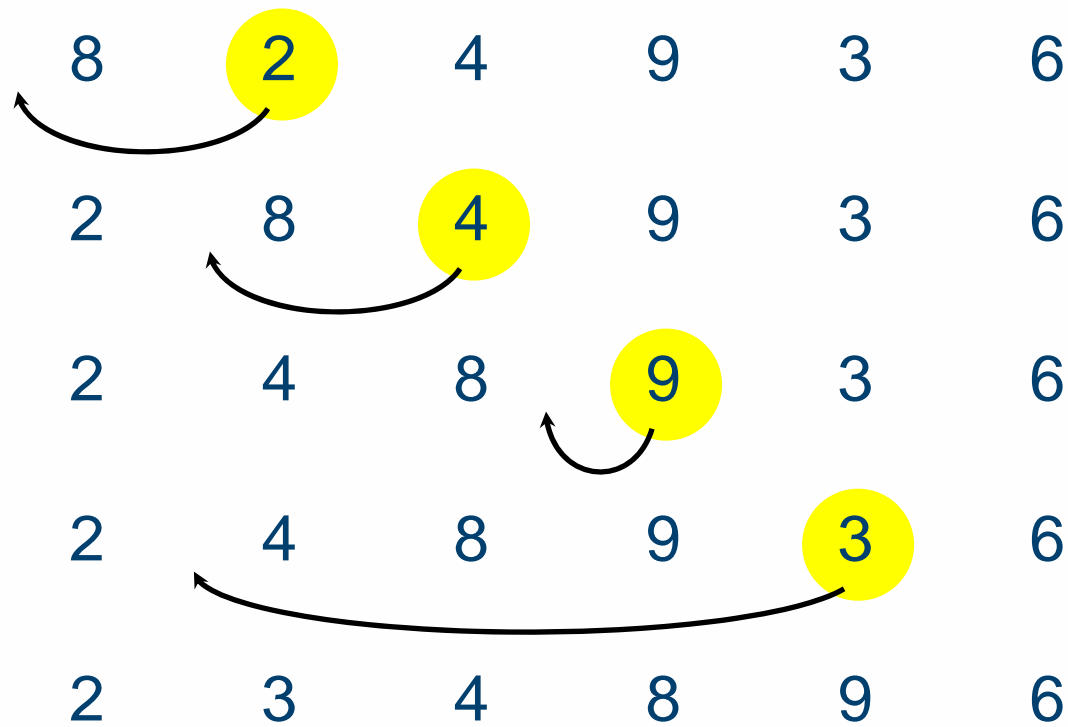
Esempio di Insertion Sort



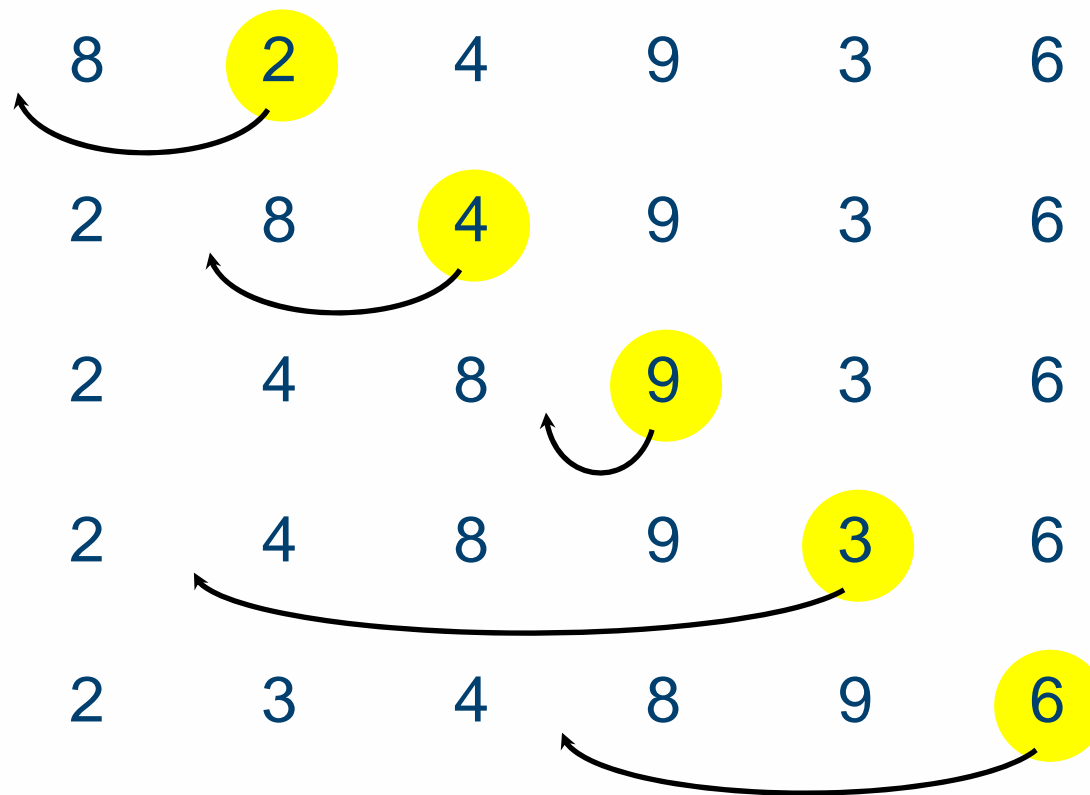
Esempio di Insertion Sort



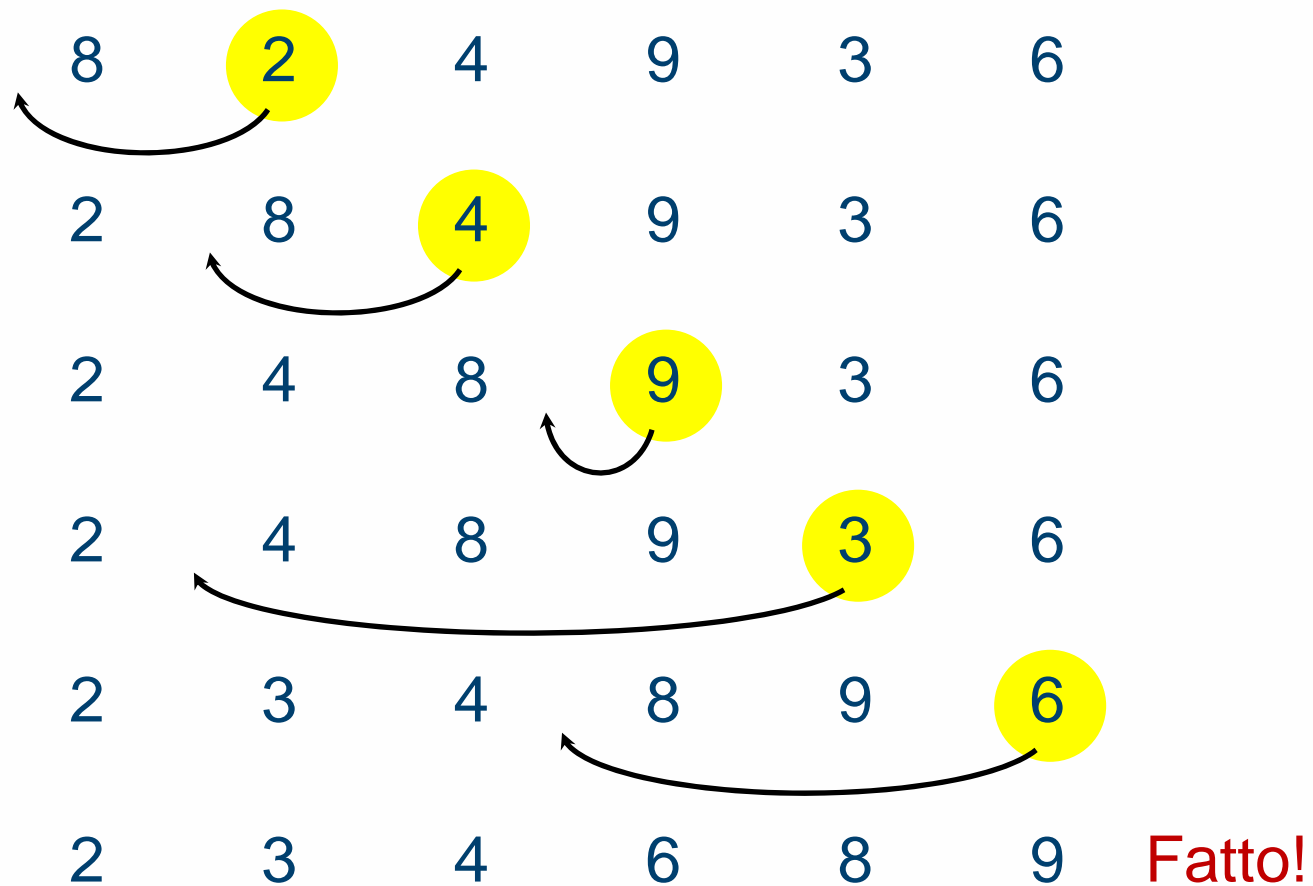
Esempio di Insertion Sort



Esempio di Insertion Sort



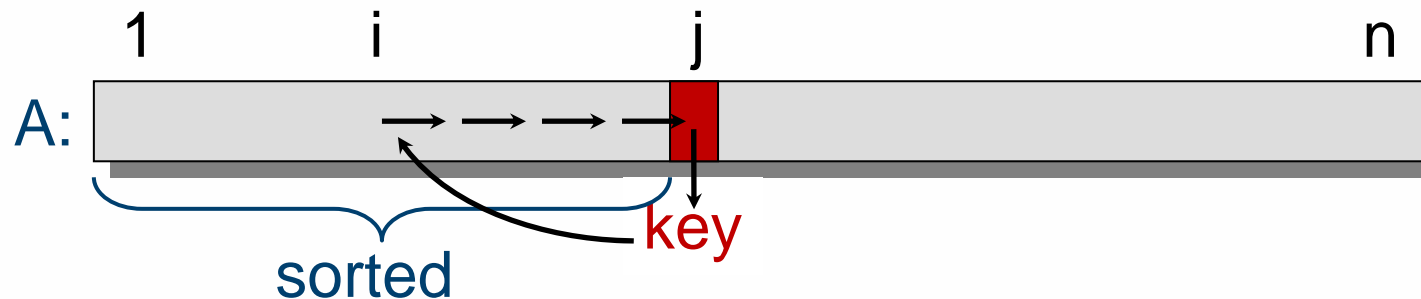
Esempio di Insertion Sort



Insertion Sort

“pseudo codice”

```
INSERTION-SORT (A, n)
  for j ← 2 to n
    do key ← A[ j ]
      i ← j - 1
      while i > 0 and A[i] > key
        do A[i+1] ← A[i]
          i ← i - 1
      A[i+1] = key
```



Secondo Esercizio: Merge Sort

Ordiniamo l'array!

- ❑ Implementare una funzione:
void mergesort (int v[], int aux[], int left, int right);
- ❑ Inserirla tra la lettura e la scrittura dei dati

Merge Sort

MERGE-SORT $A[1 \dots n]$

1. If $n = 1$, done.
2. MERGE-SORT $A[1 \dots \lceil n/2 \rceil]$
3. MERGE-SORT $A[\lceil n/2 \rceil + 1 \dots n]$
4. merge the two sorted arrays
 $A[1 \dots \lceil n/2 \rceil]$ and $A[\lceil n/2 \rceil + 1 \dots n]$

Punto chiave: il merge dei due vettori

Merge di Due Vettori Ordinati

20 12

13 11

7 9

2

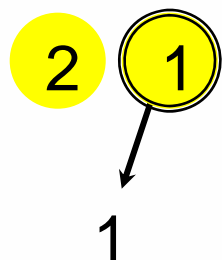
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Merge di Due Vettori Ordinati

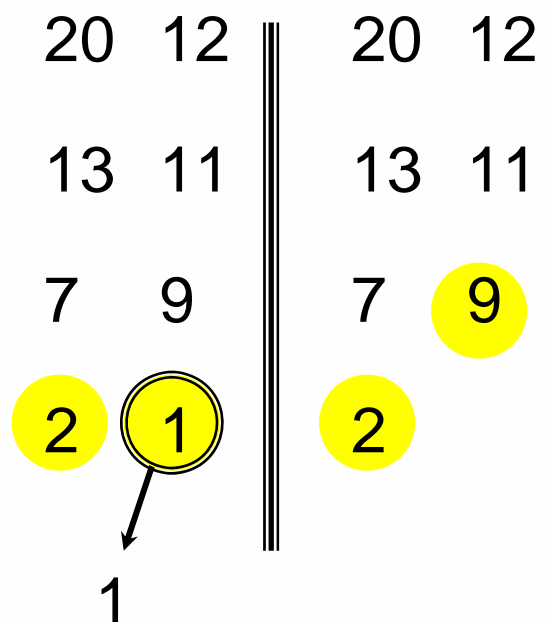
20 12

13 11

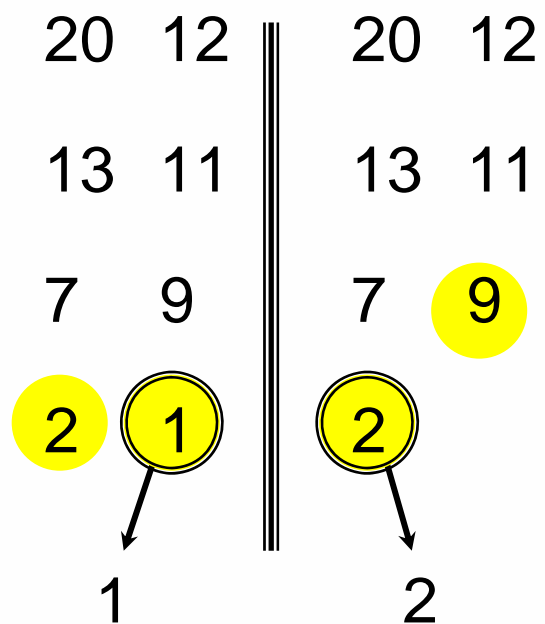
7 9



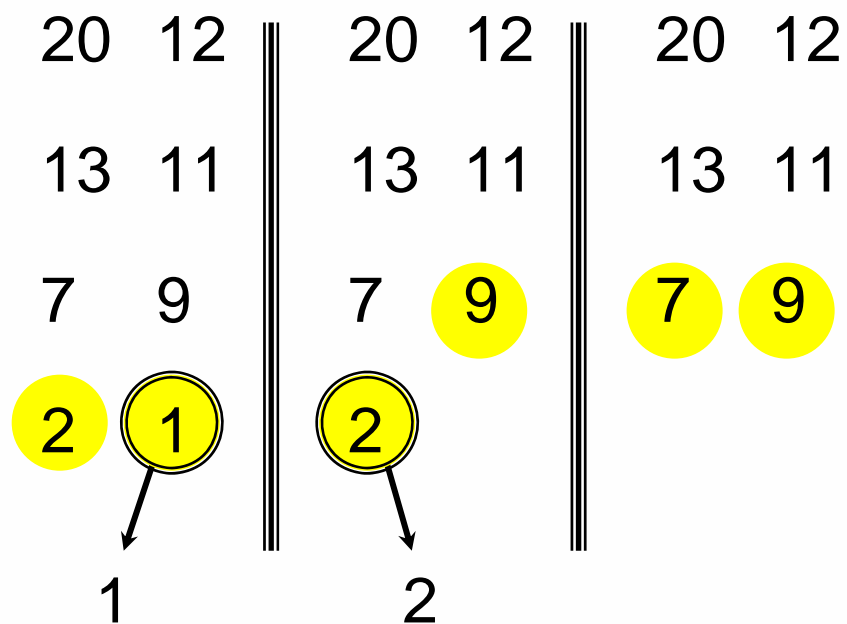
Merge di Due Vettori Ordinati



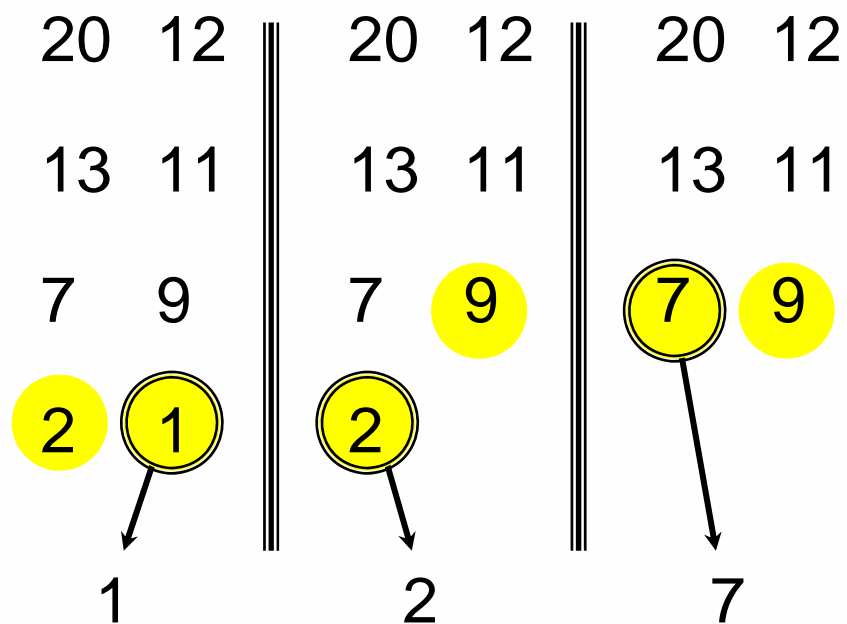
Merge di Due Vettori Ordinati



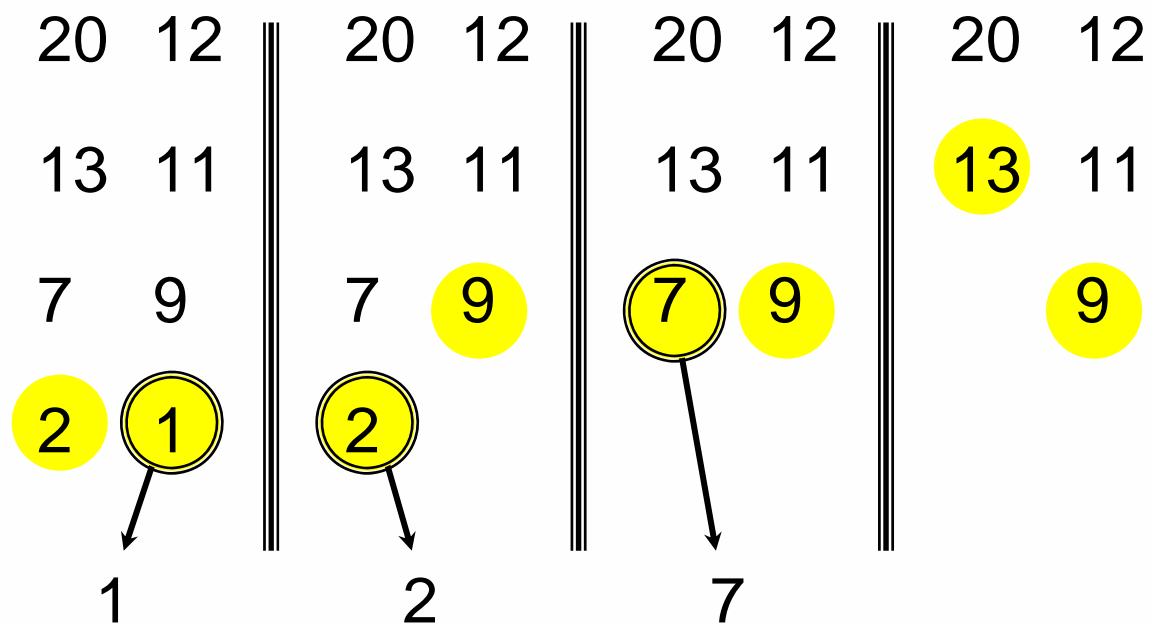
Merge di Due Vettori Ordinati



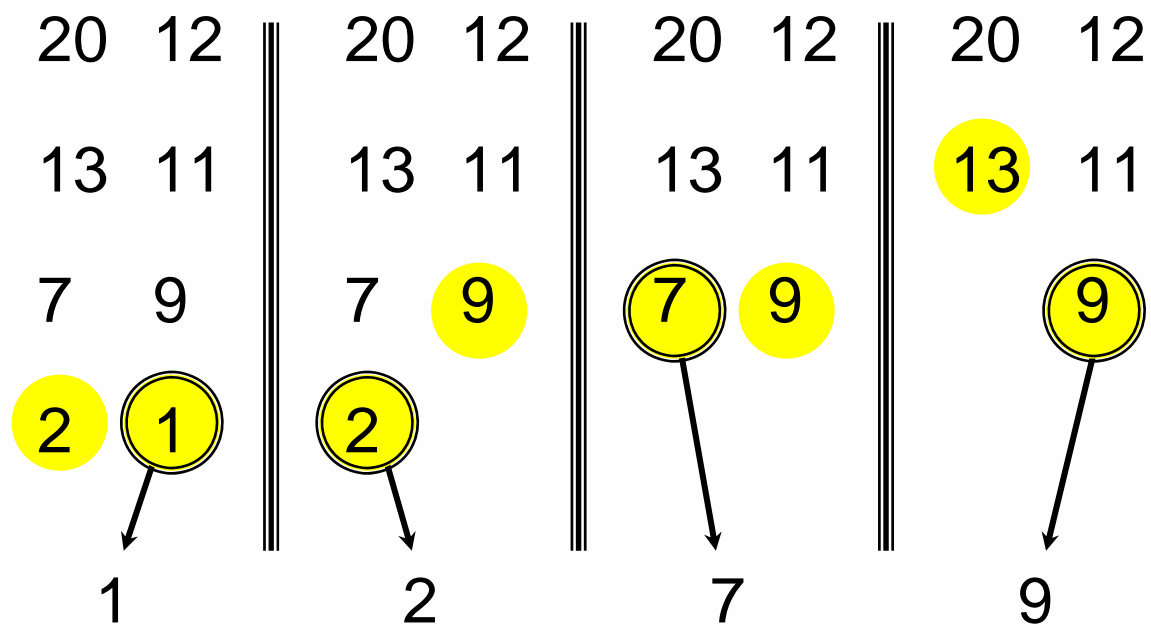
Merge di Due Vettori Ordinati



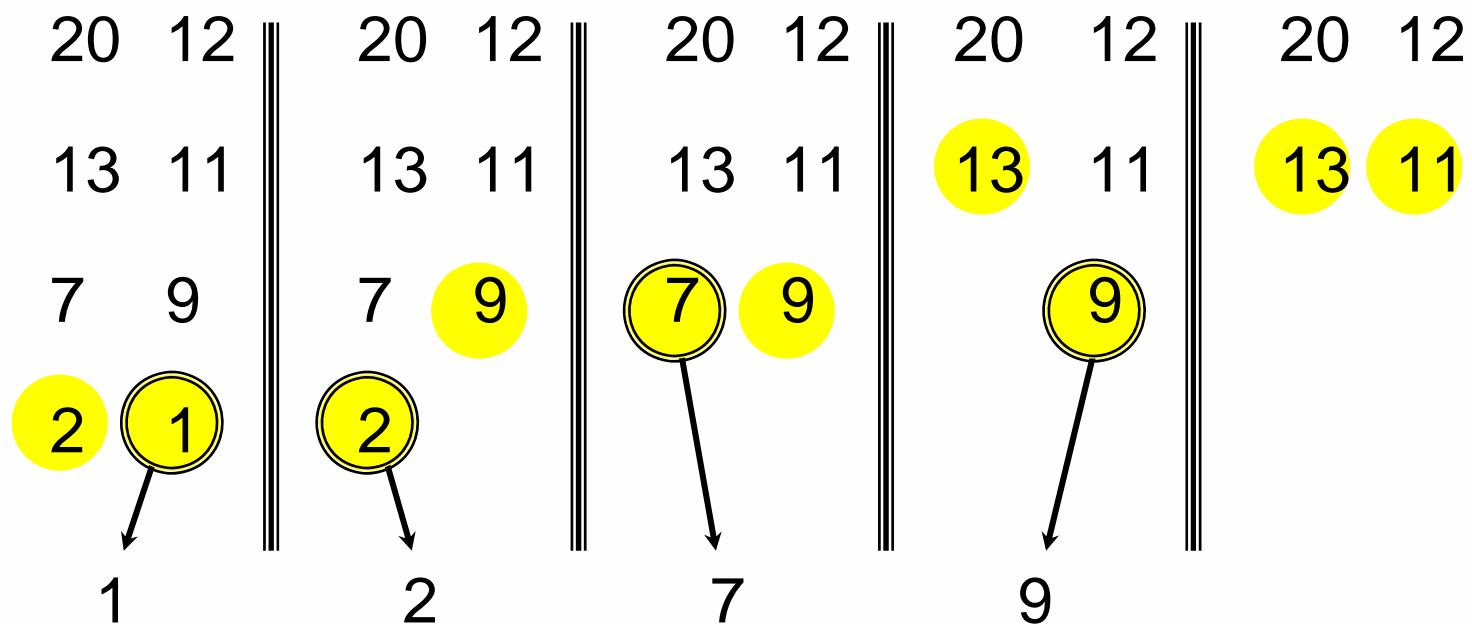
Merge di Due Vettori Ordinati



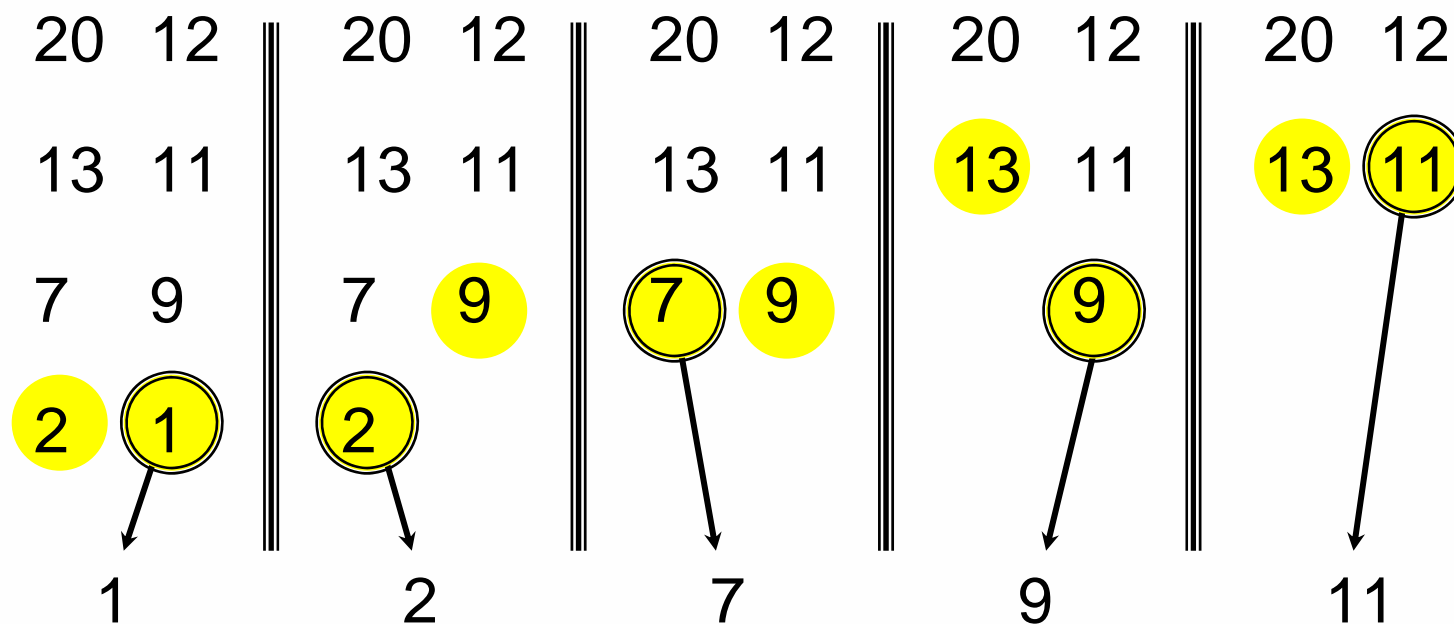
Merge di Due Vettori Ordinati



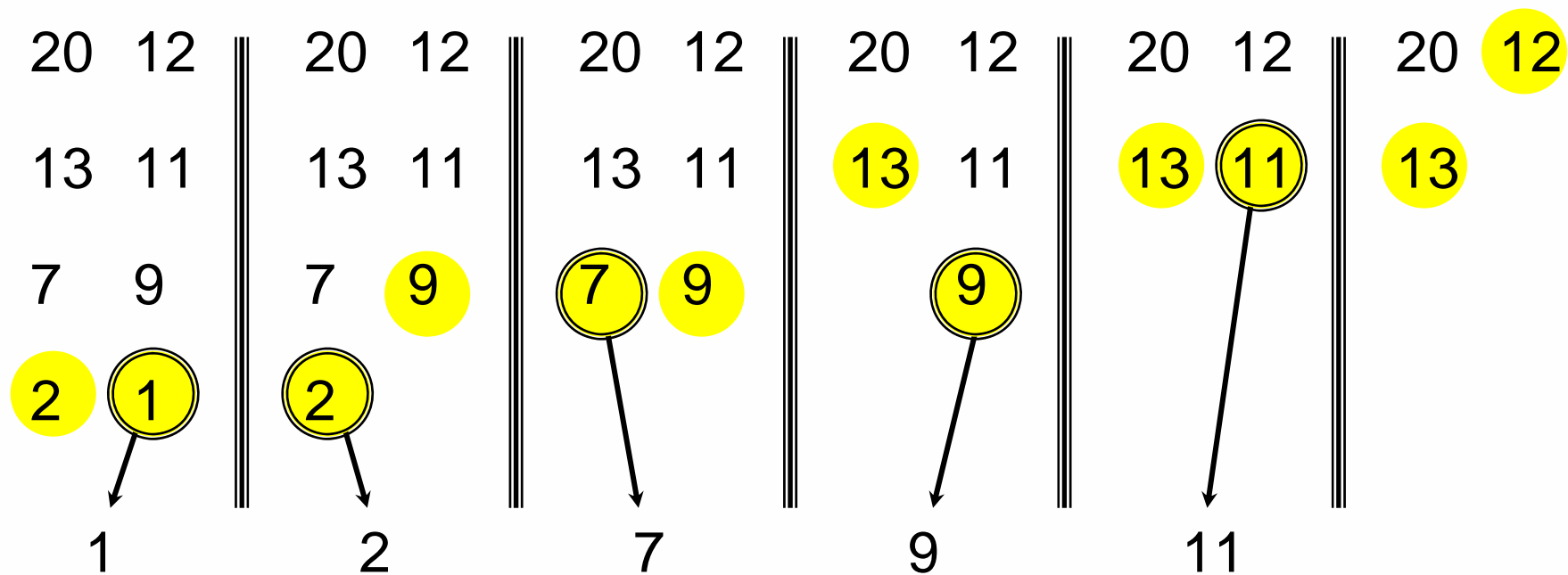
Merge di Due Vettori Ordinati



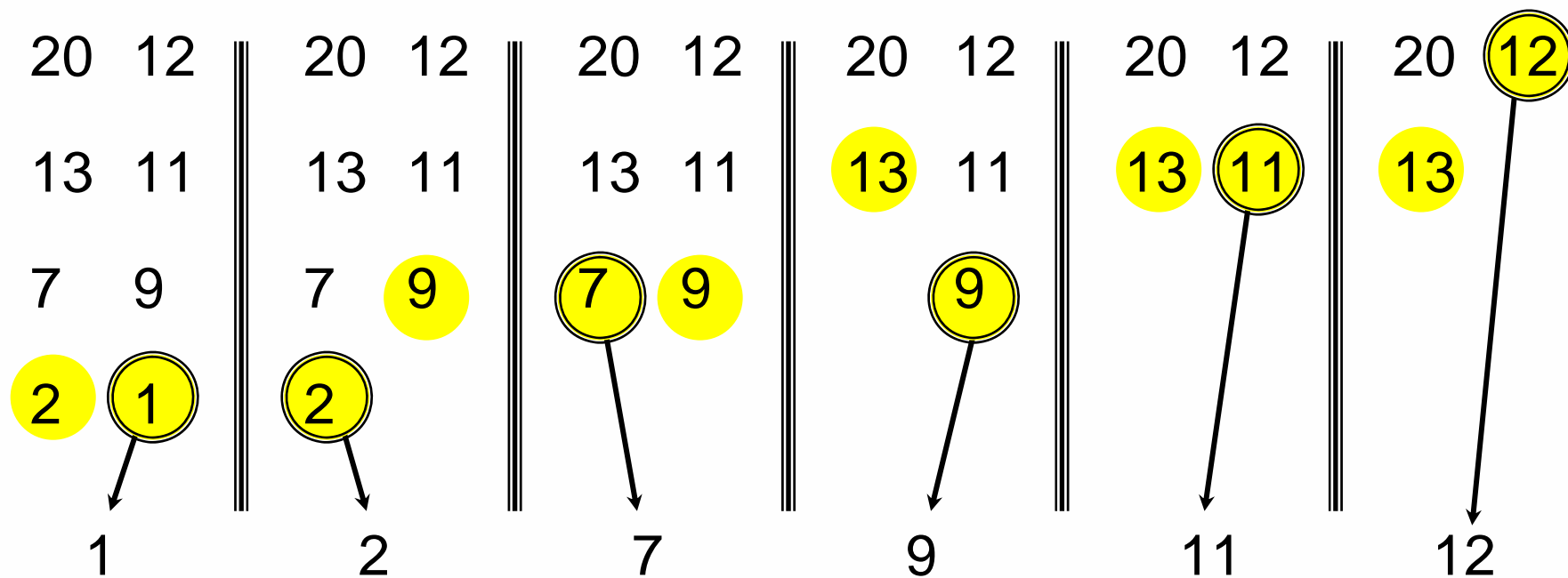
Merge di Due Vettori Ordinati



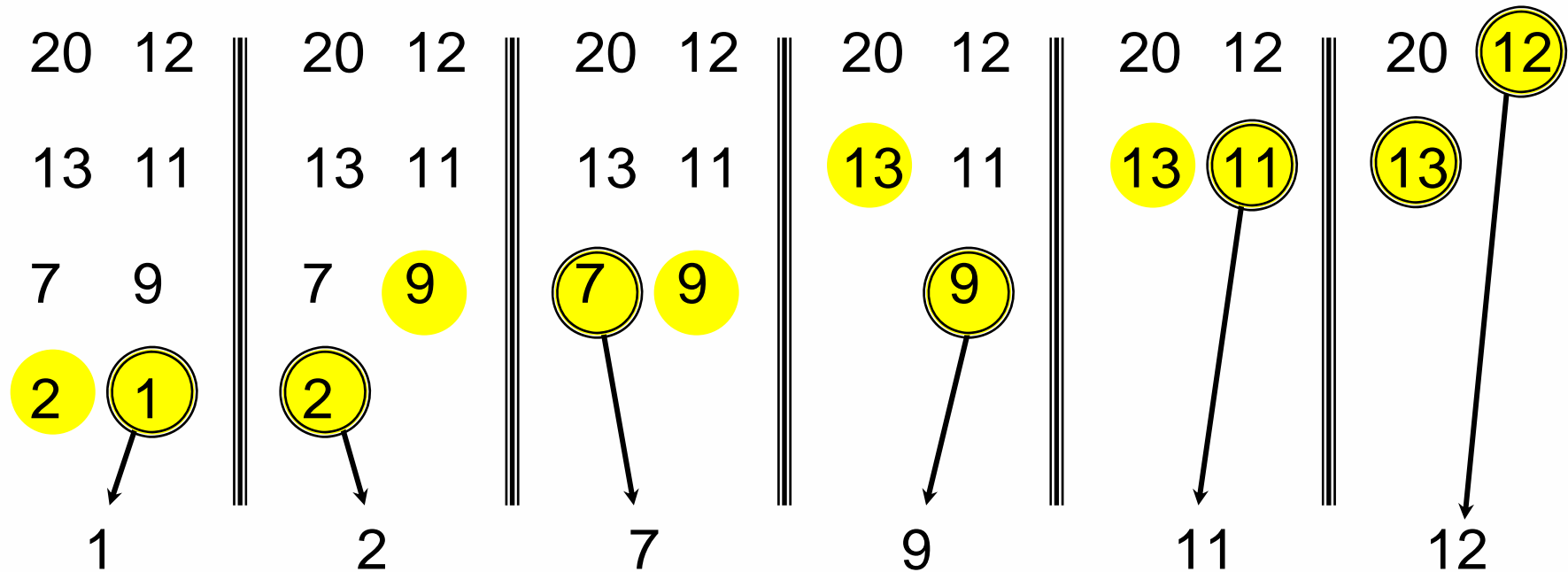
Merge di Due Vettori Ordinati



Merge di Due Vettori Ordinati



Merge di Due Vettori Ordinati



Il merge è $\Theta(n)$

Merge Sort

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Suggerimenti

1. Utilizzare come parametri della funzione due indici left e right per identificare la porzione di array da ordinare
 2. Usare un vettore ausiliario durante l'operazione di merge
- `void mergesort (int v[], int aux[], int left, int right)`