ALGORITMA SORTING

Source : Binus University

Learning Outcomes

Pada akhir pertemuan ini, diharapkan mahasiswa akan mampu:

- **Menjelaskan definisi sorting**
- **Mensimulasikan algoritma sorting**
- **Menggunakan sorting dalam pembuatan program**

Outline Materi

- Definisi Sorting
- Bubble Sort
- Selection Sort
- Insertion Sort
- Merge Sort

Definisi Sorting

- Pengurutan bilangan, huruf, kata, atau nilai lainnya sesuai dengan aturan tertentu
- Mengilustrasikan pemecahan masalah
- Teknik penggunaan seleksi, perulangan, method, dan array
- Demonstrasi performa/kompleksitas algoritma
- Mempercepat proses *searching*

Algoritma Sorting

- Algoritma sorting dasar:
  - Bubble Sort
  - Insertion Sort
  - Selection Sort
- Algoritma sorting lanjutan:
  - Merge Sort
  - Quick Sort
  - Bucket Sort
  - Shell Sort
  - Radix Sort
  - External Sort

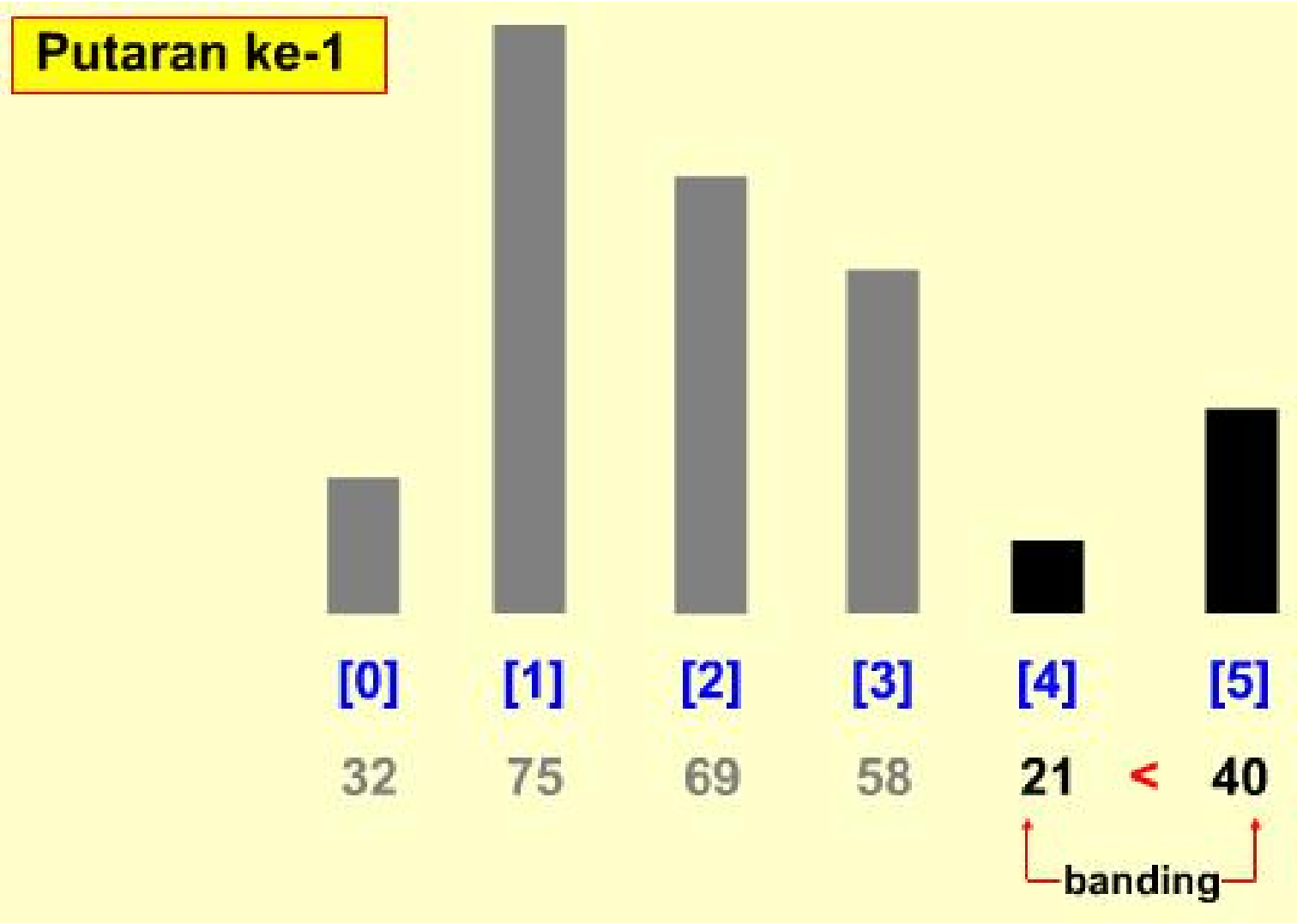
Bubble Sort

Bubble Sort

- Disebut juga *sinking sort* atau *exchange sort*
- Cara pengurutan elemen yang paling sederhana
- Menggunakan metode pembandingan dan pertukaran
- Tiap putaran, elemen yang bersebelahan akan dibandingkan dan isinya akan ditukar jika nilainya tidak berurut
- *Ascending* → pengurutan dari kecil ke besar

  Descending → pengurutan dari besar ke kecil

Bubble Sort



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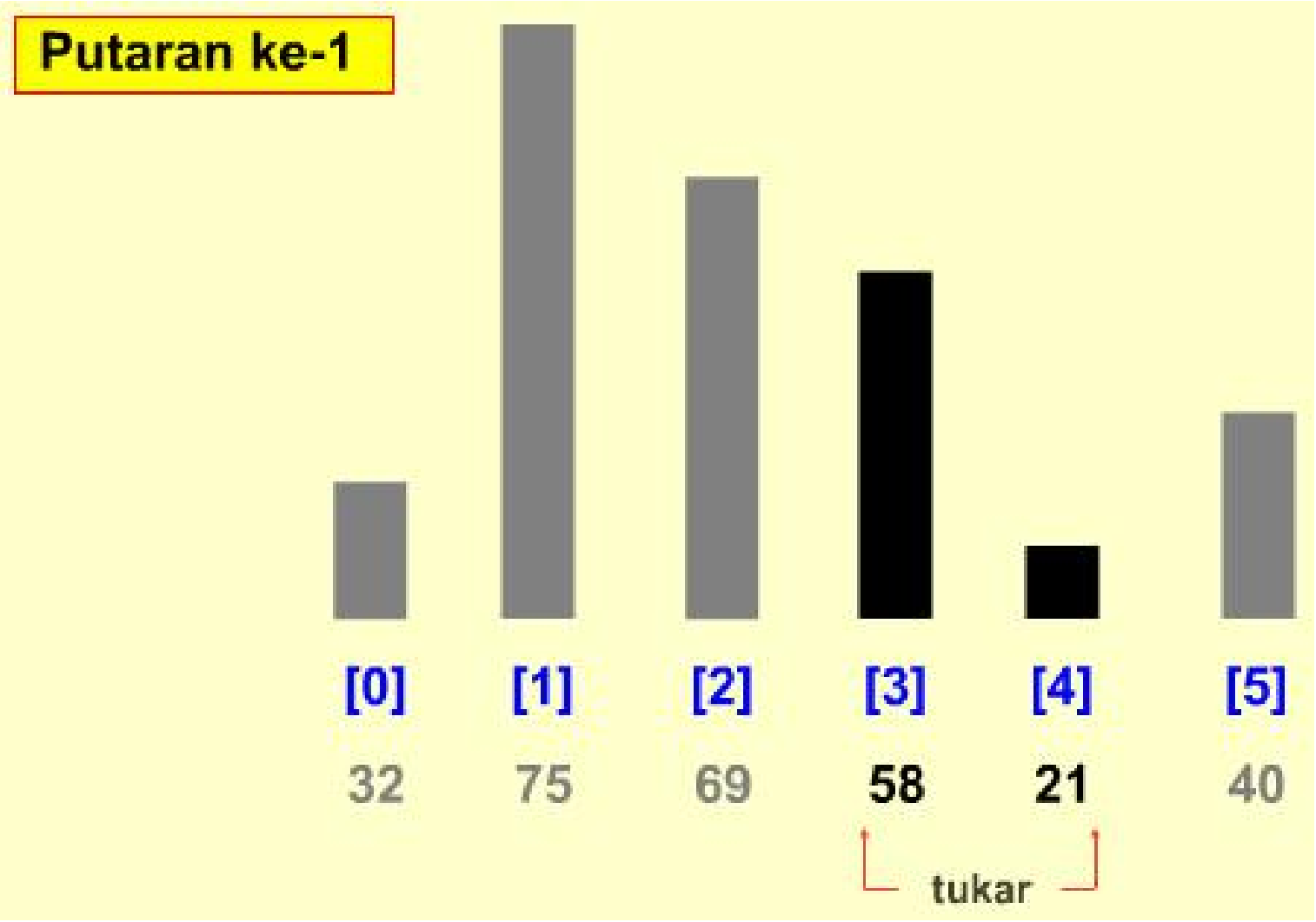

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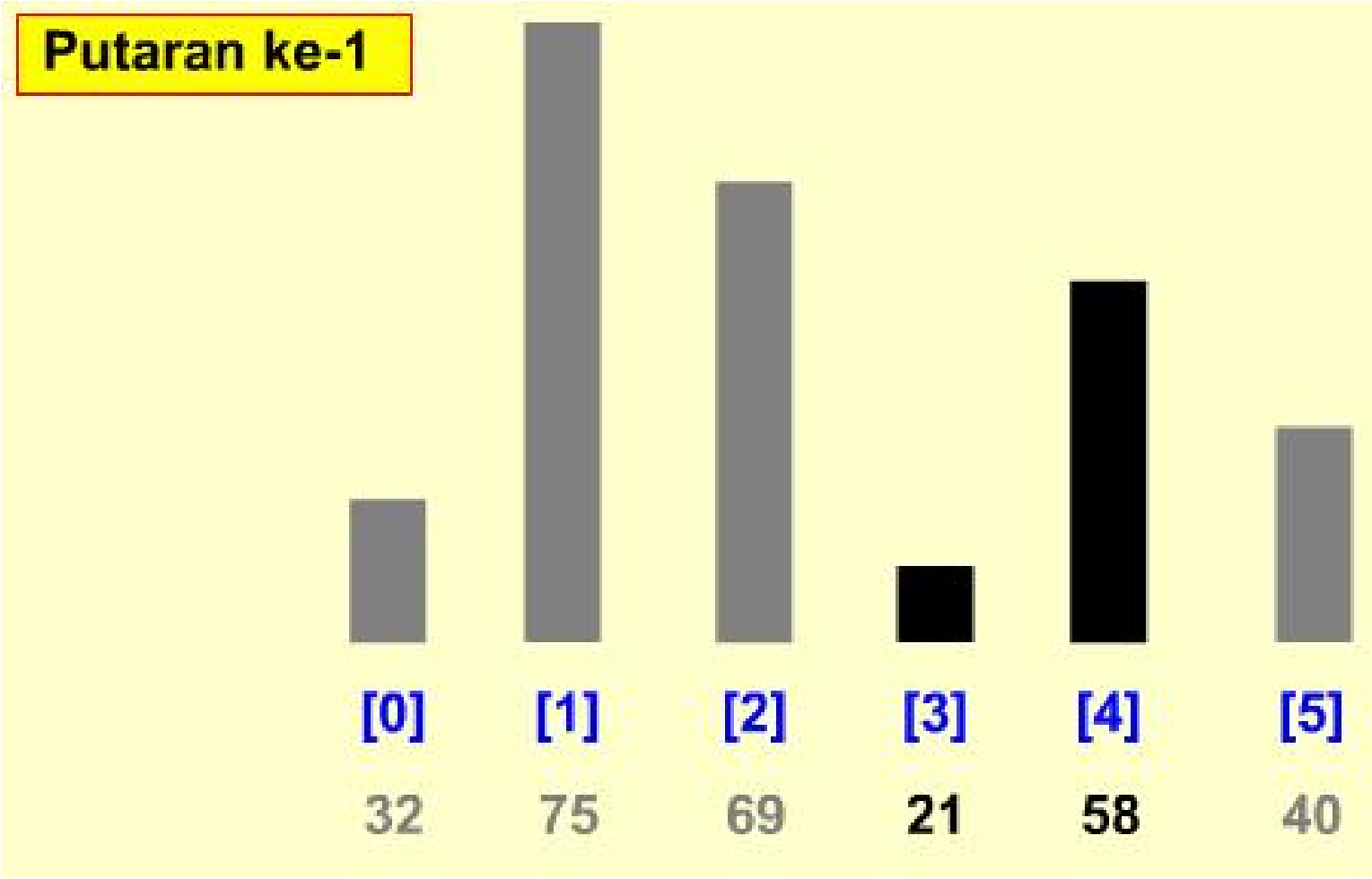

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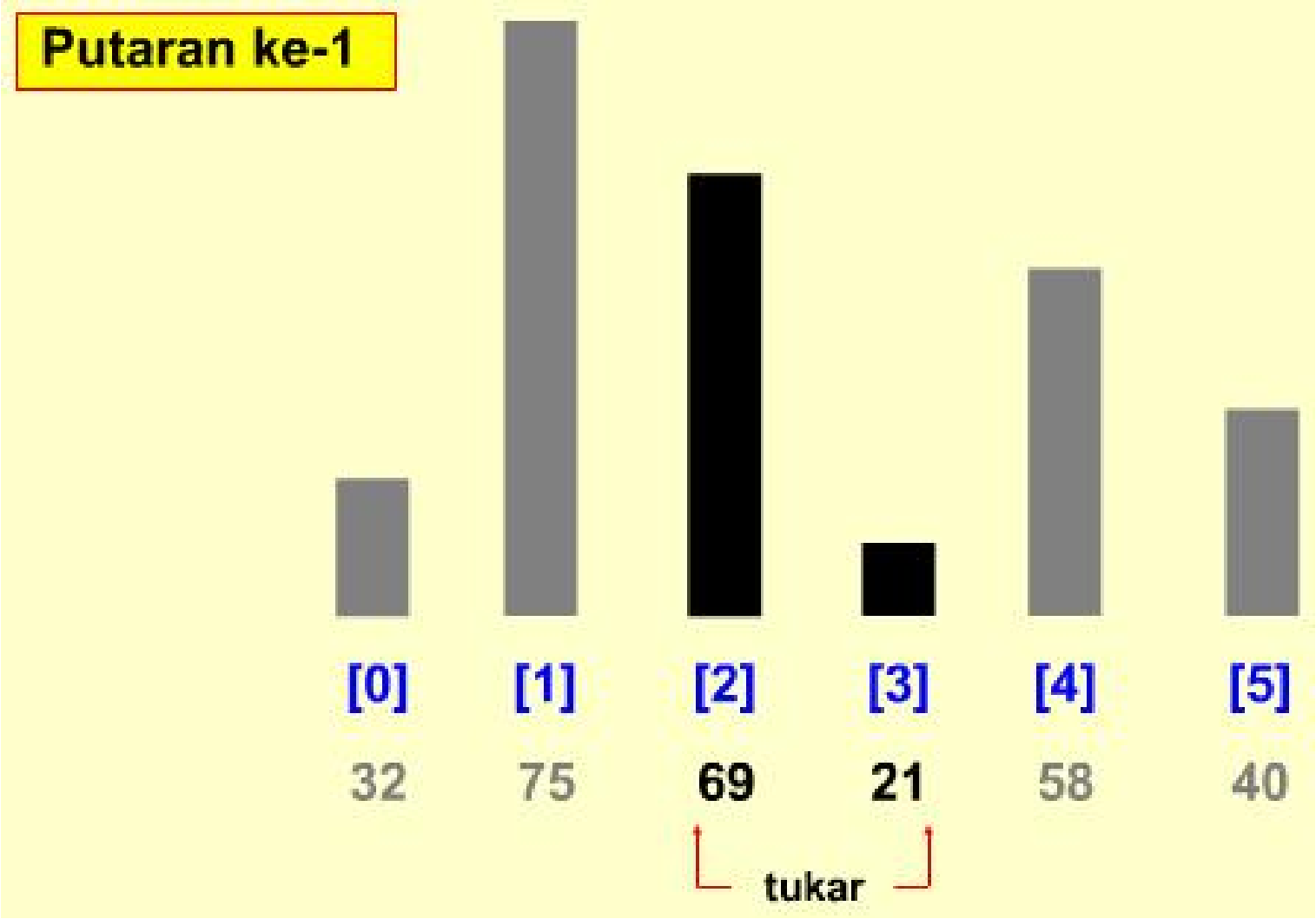

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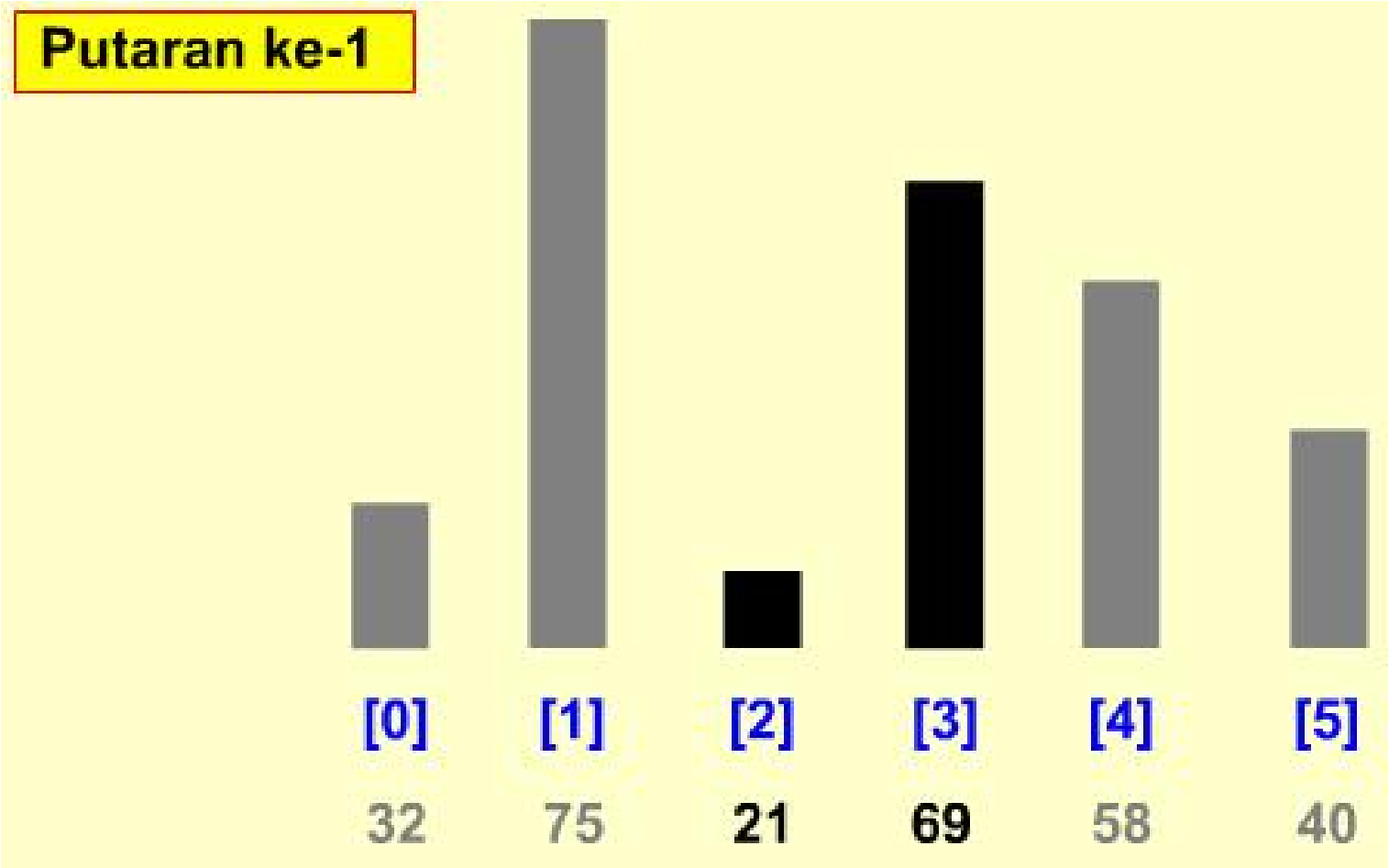

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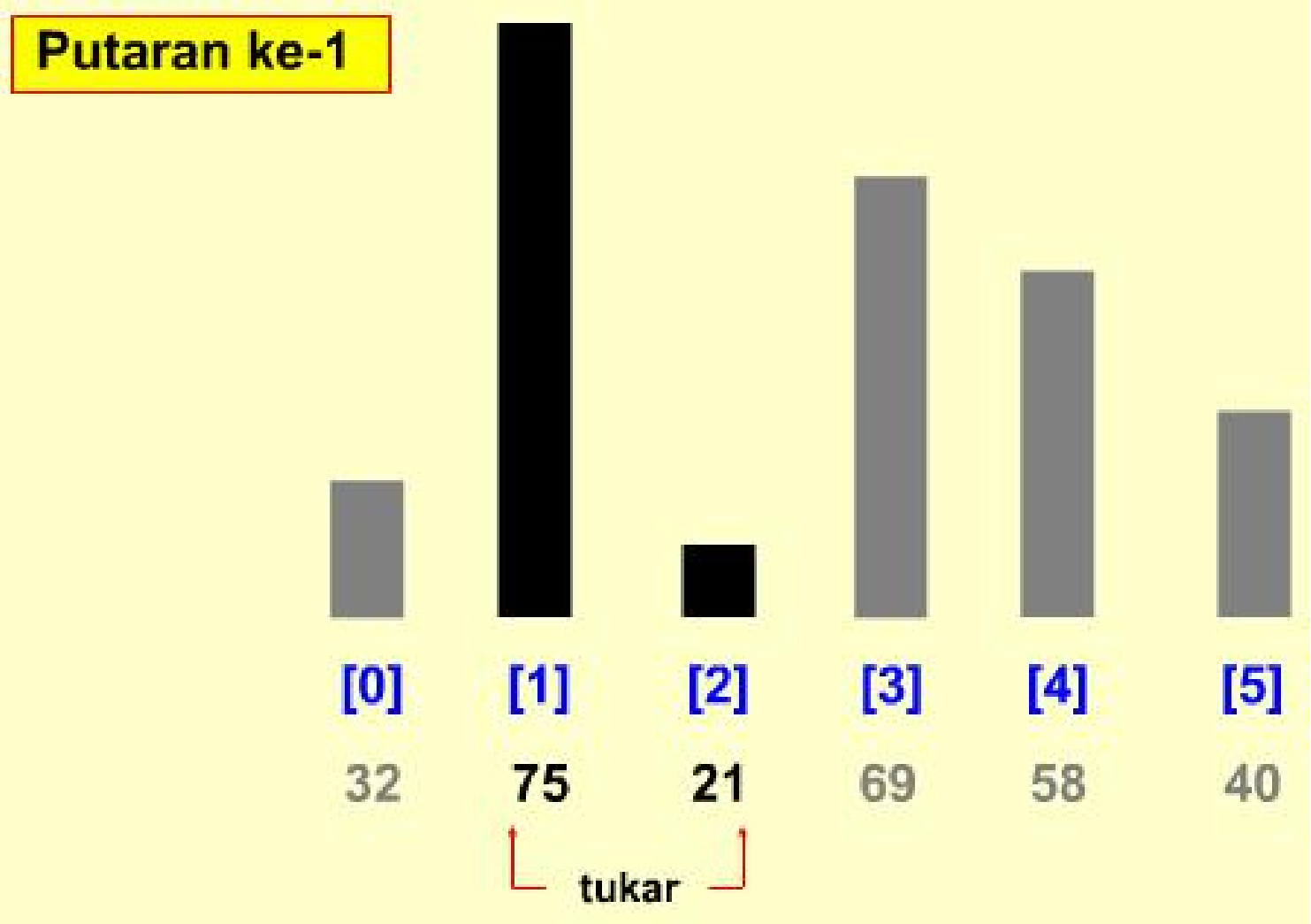

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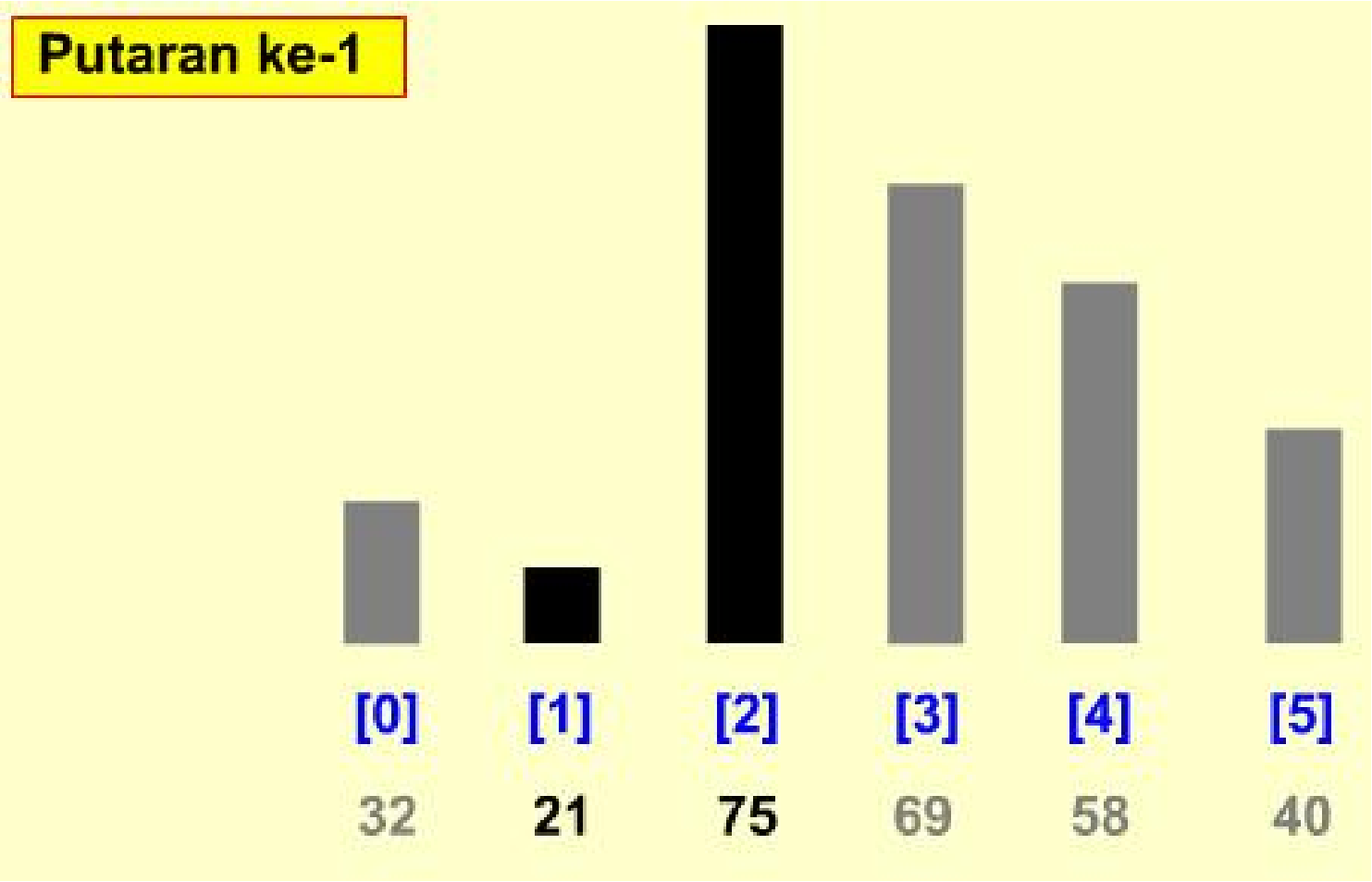

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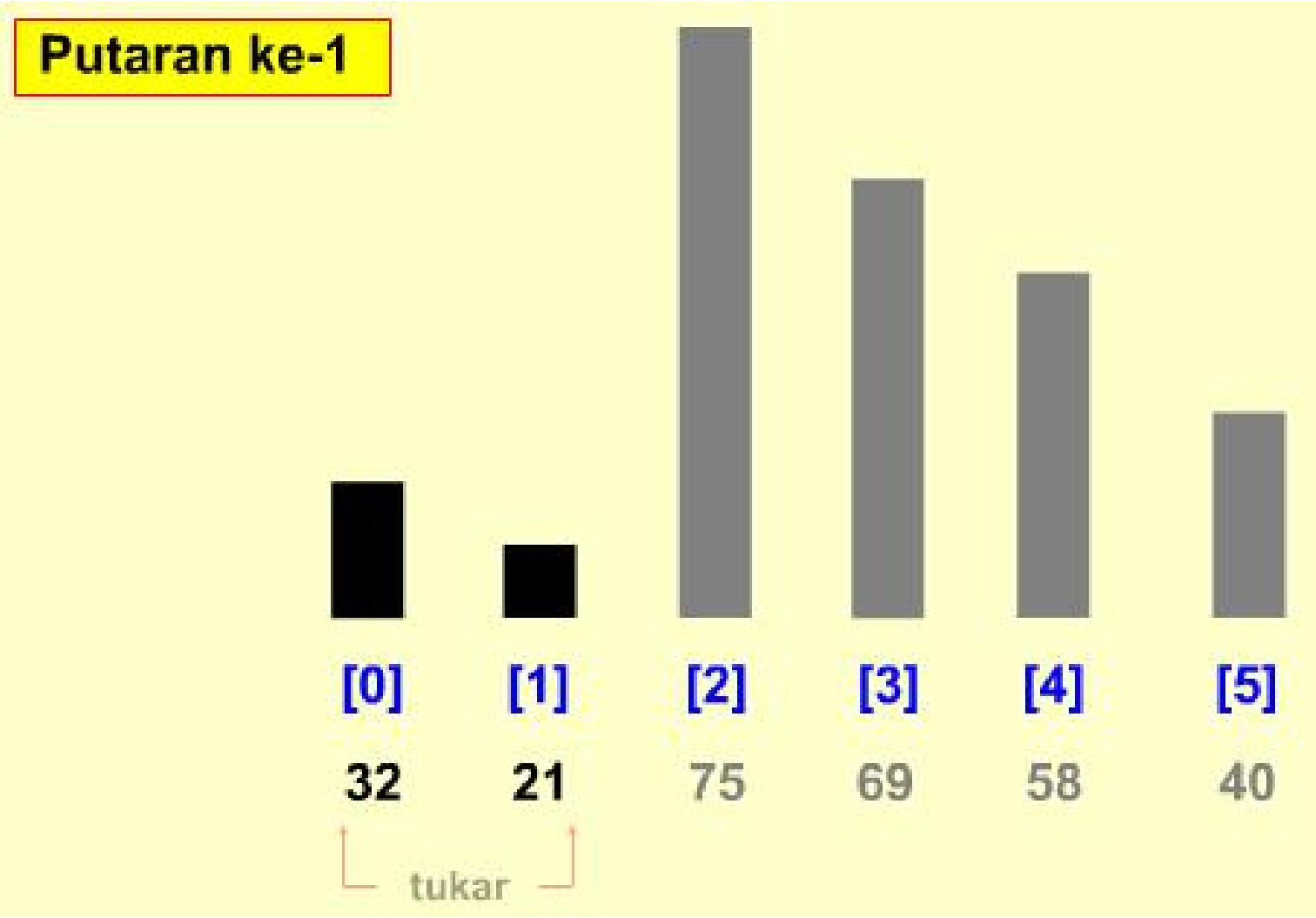

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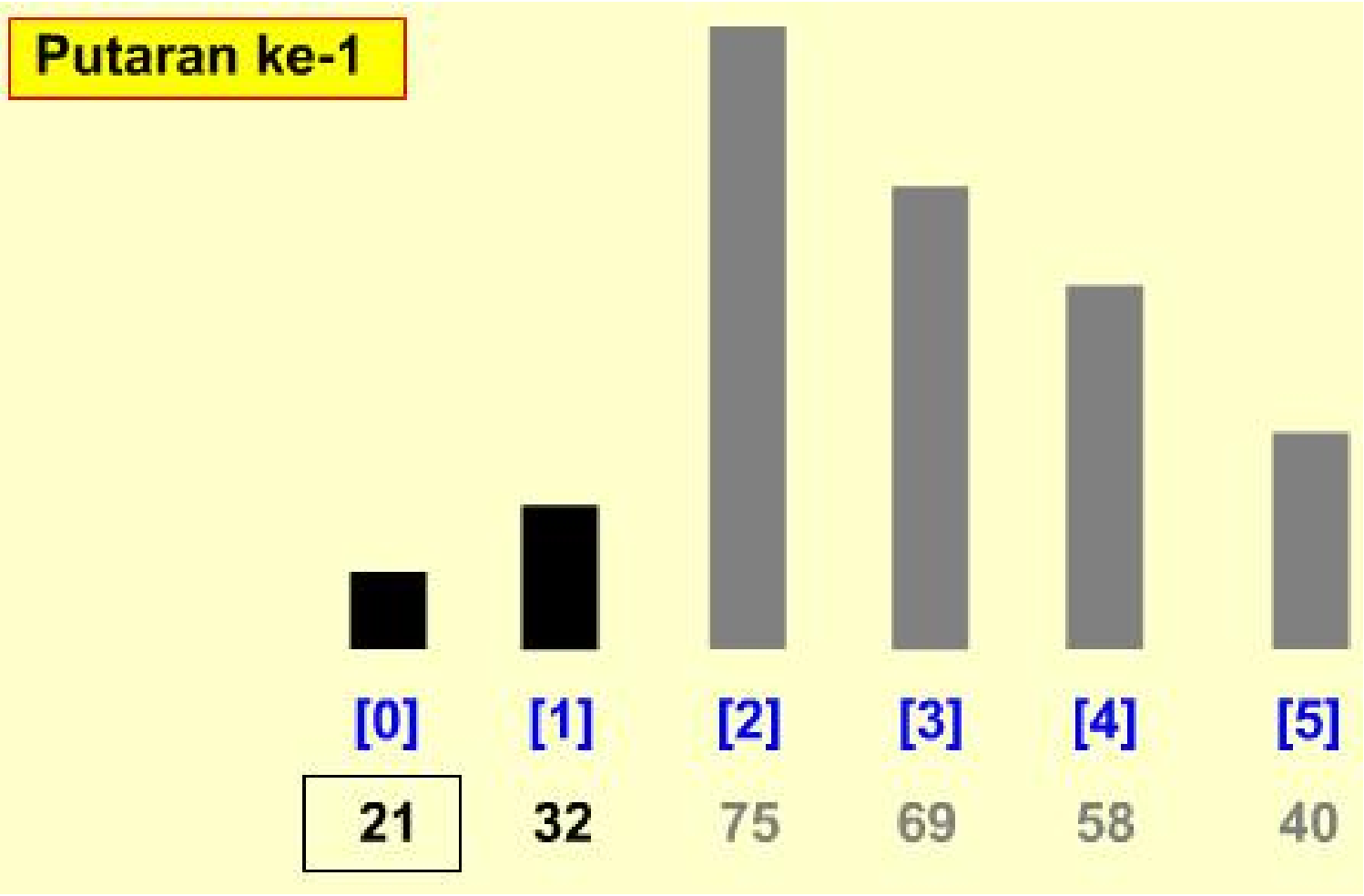

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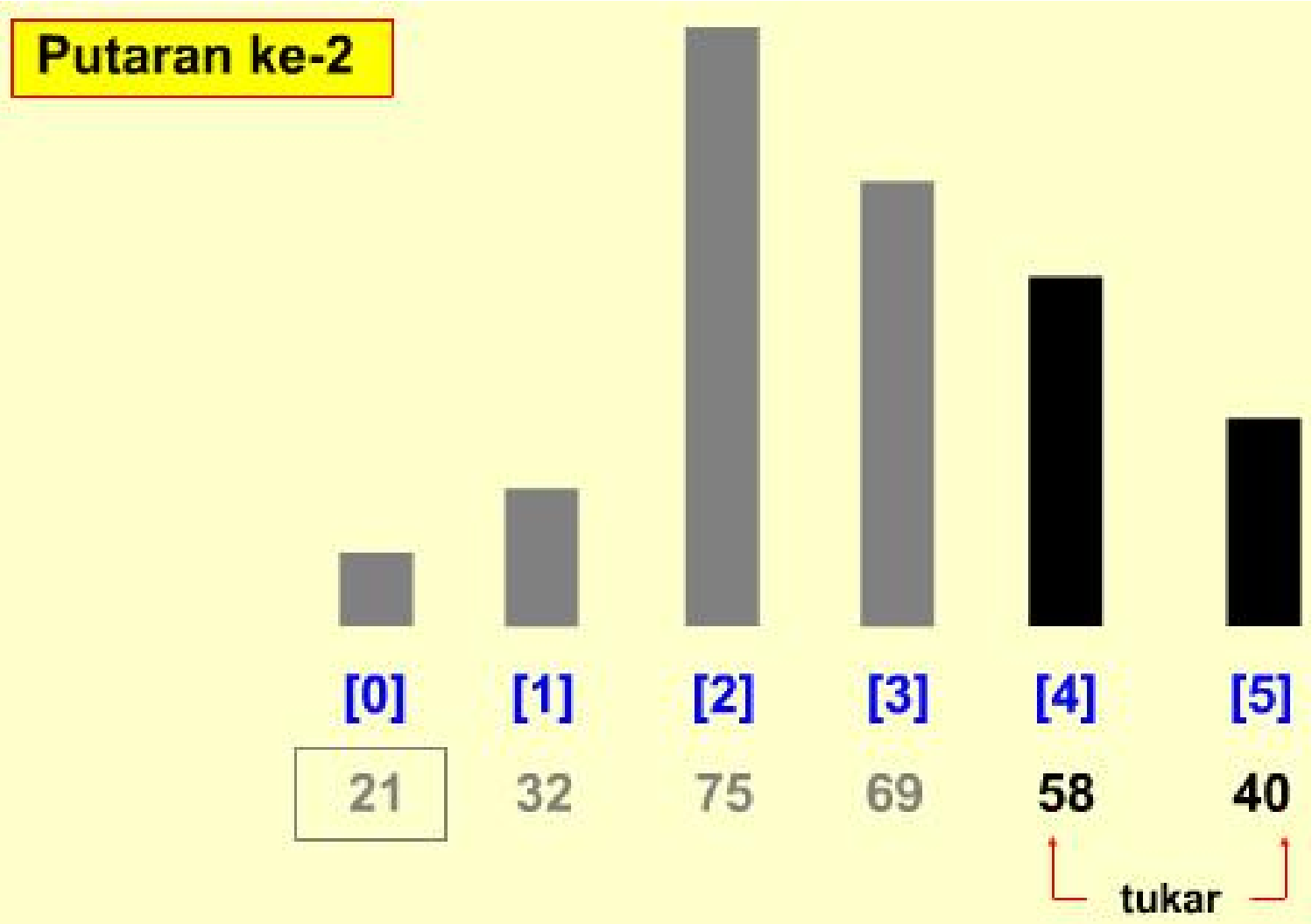

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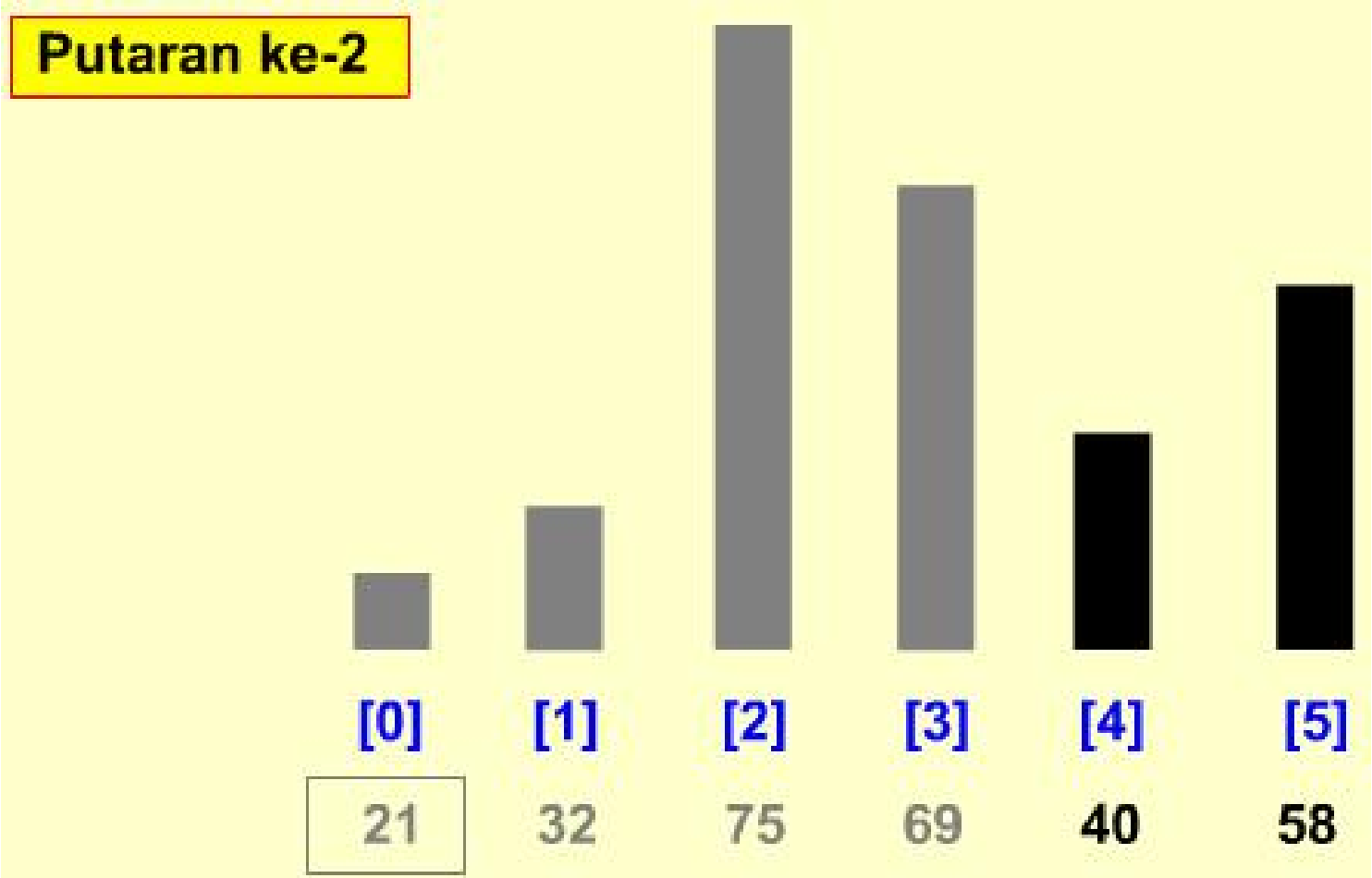

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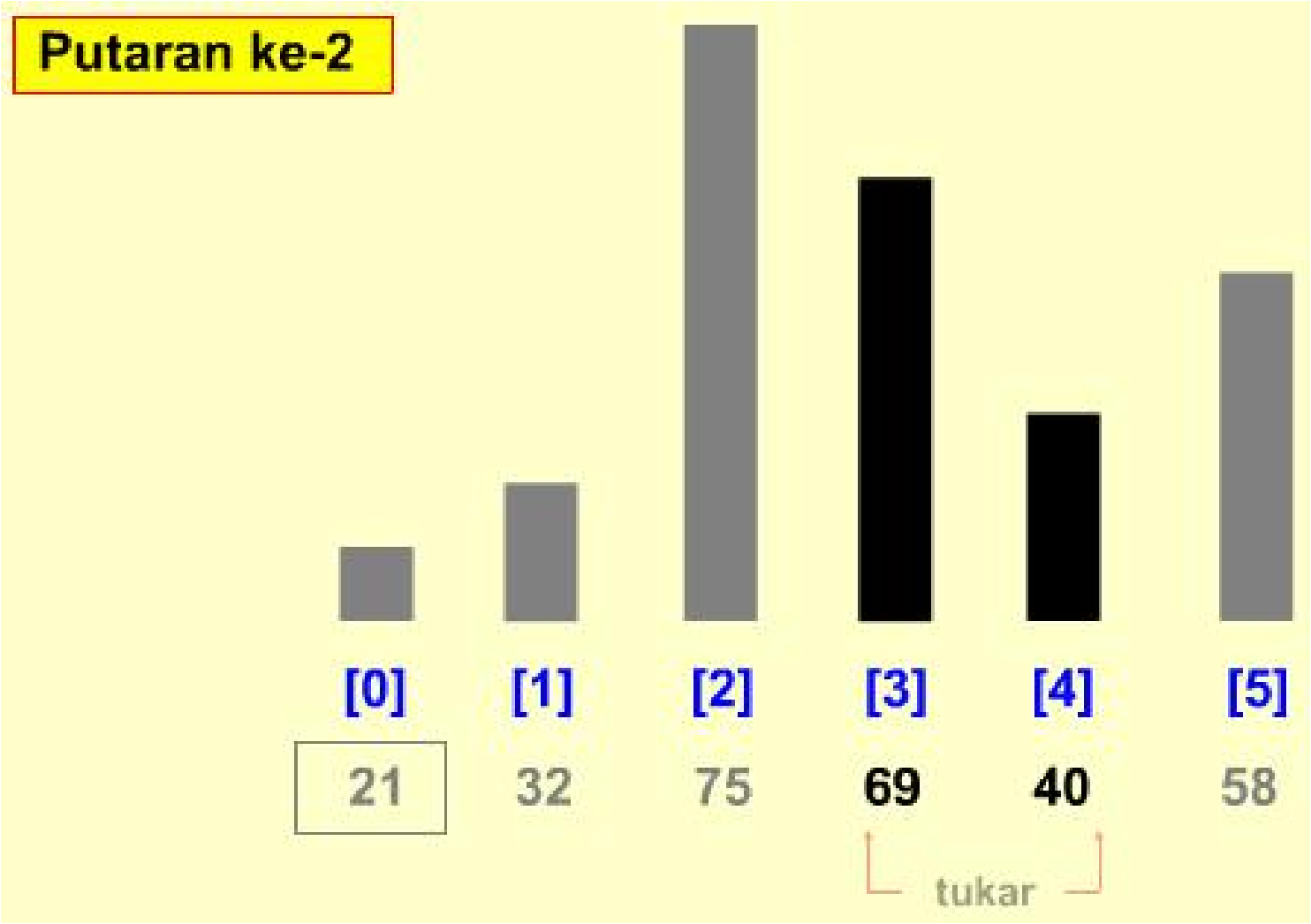

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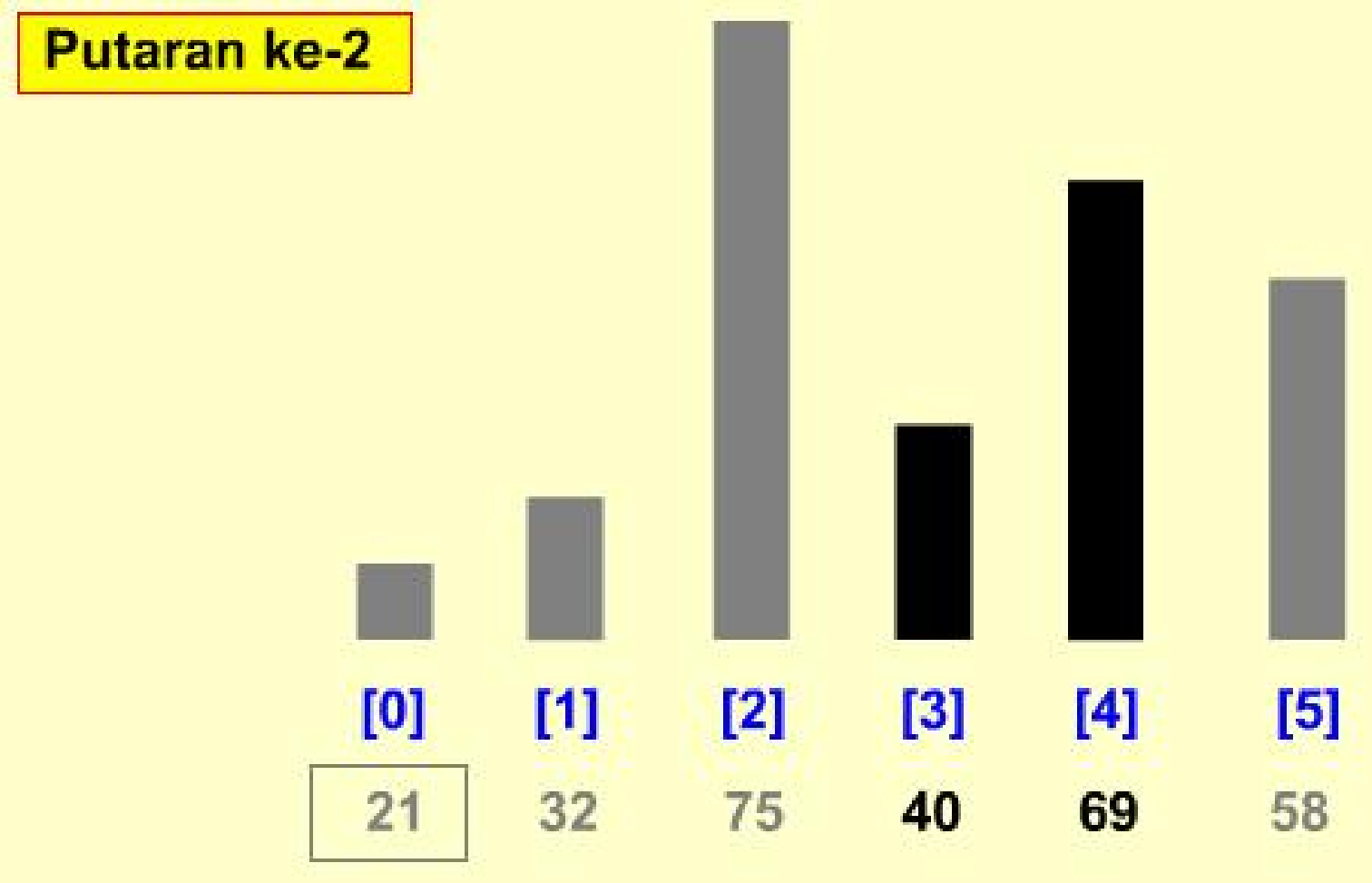

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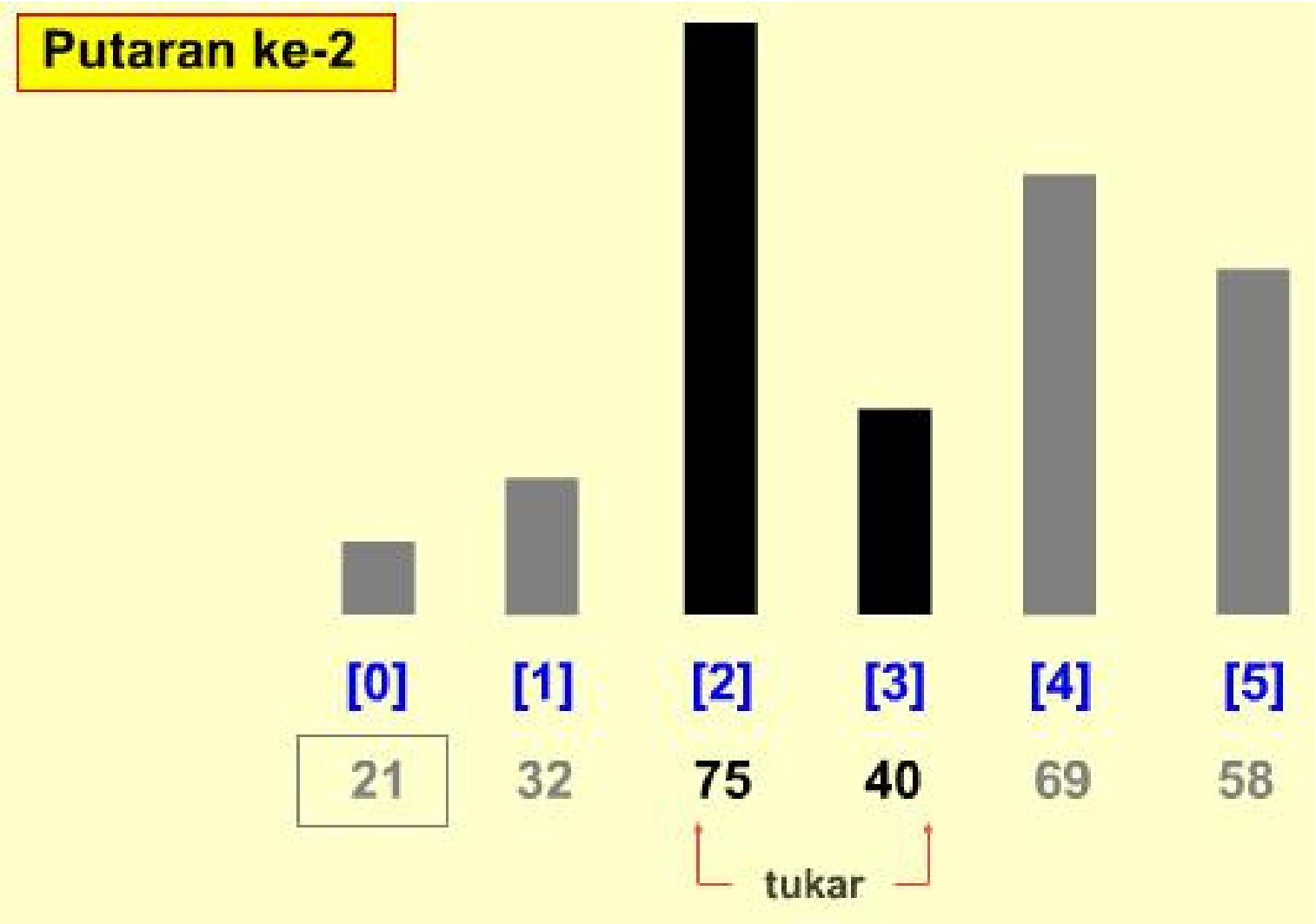

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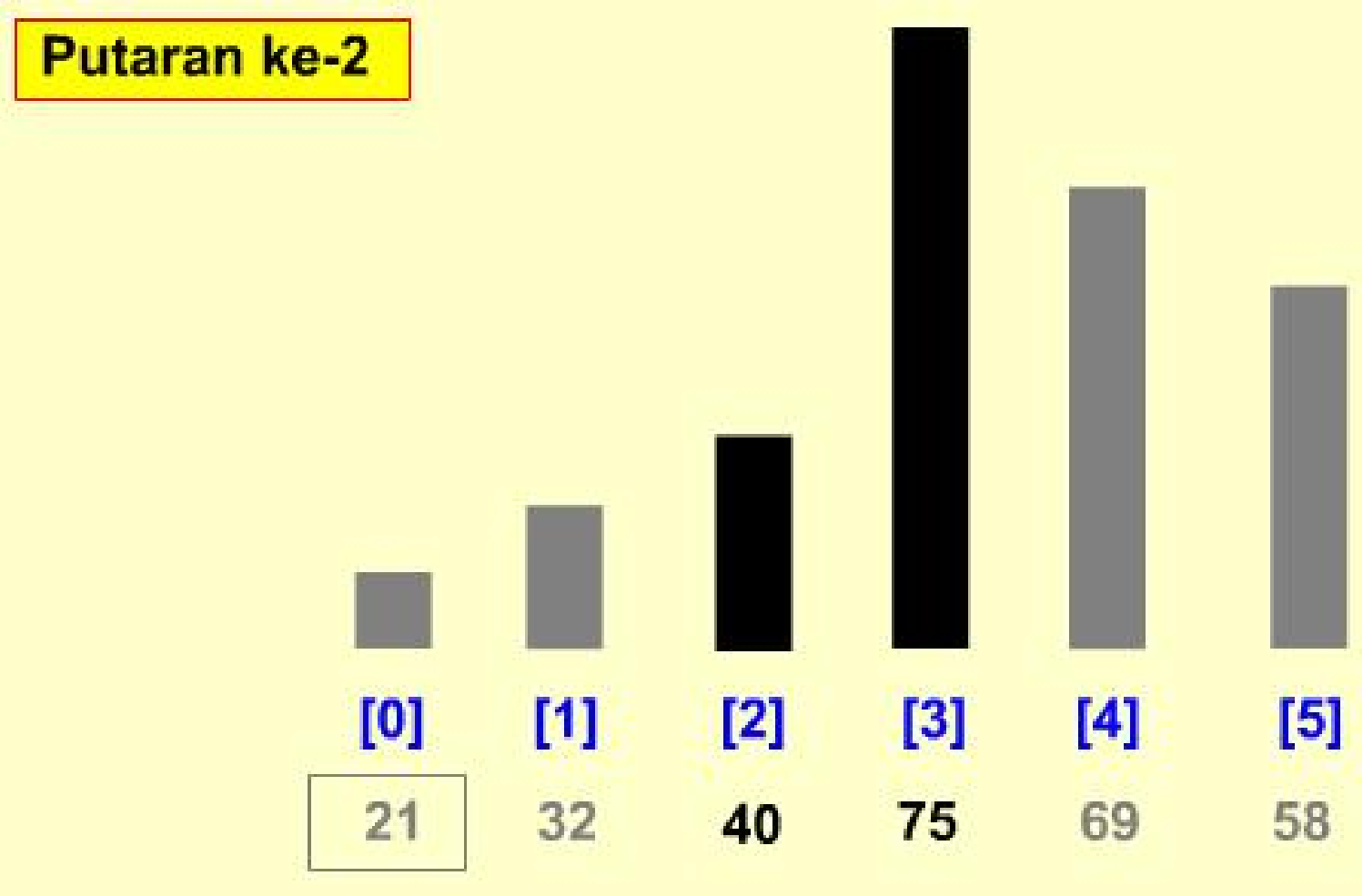

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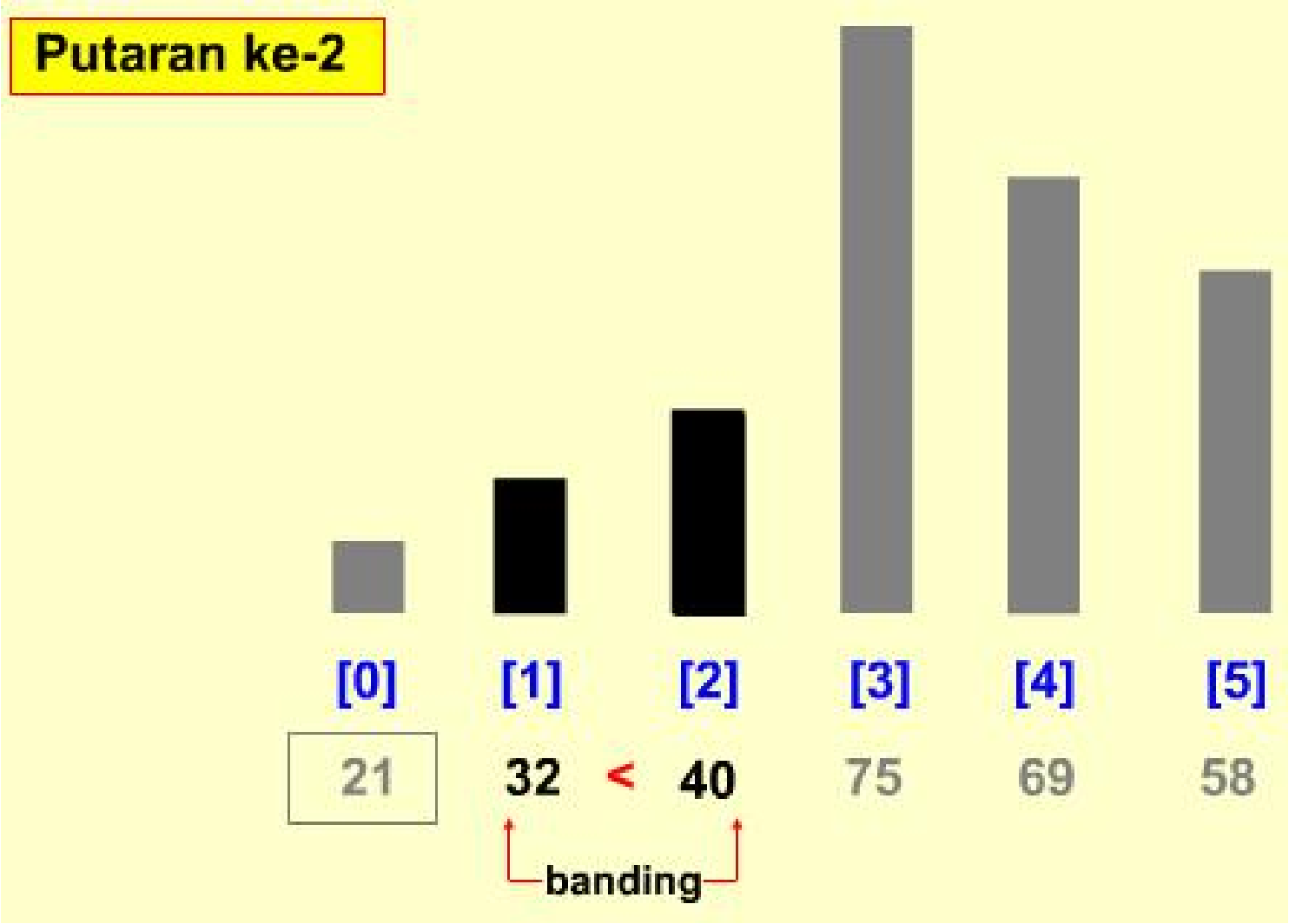

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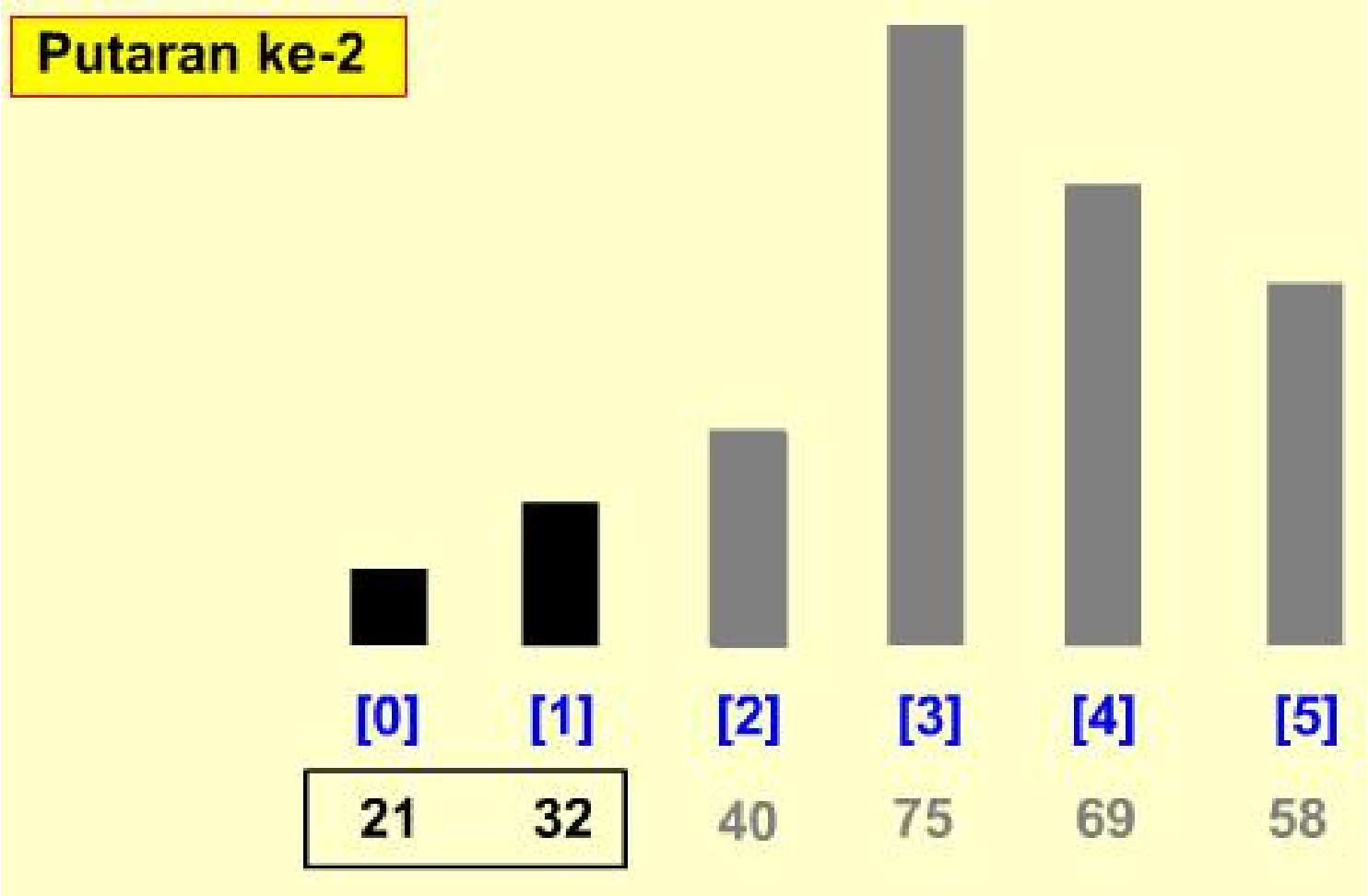

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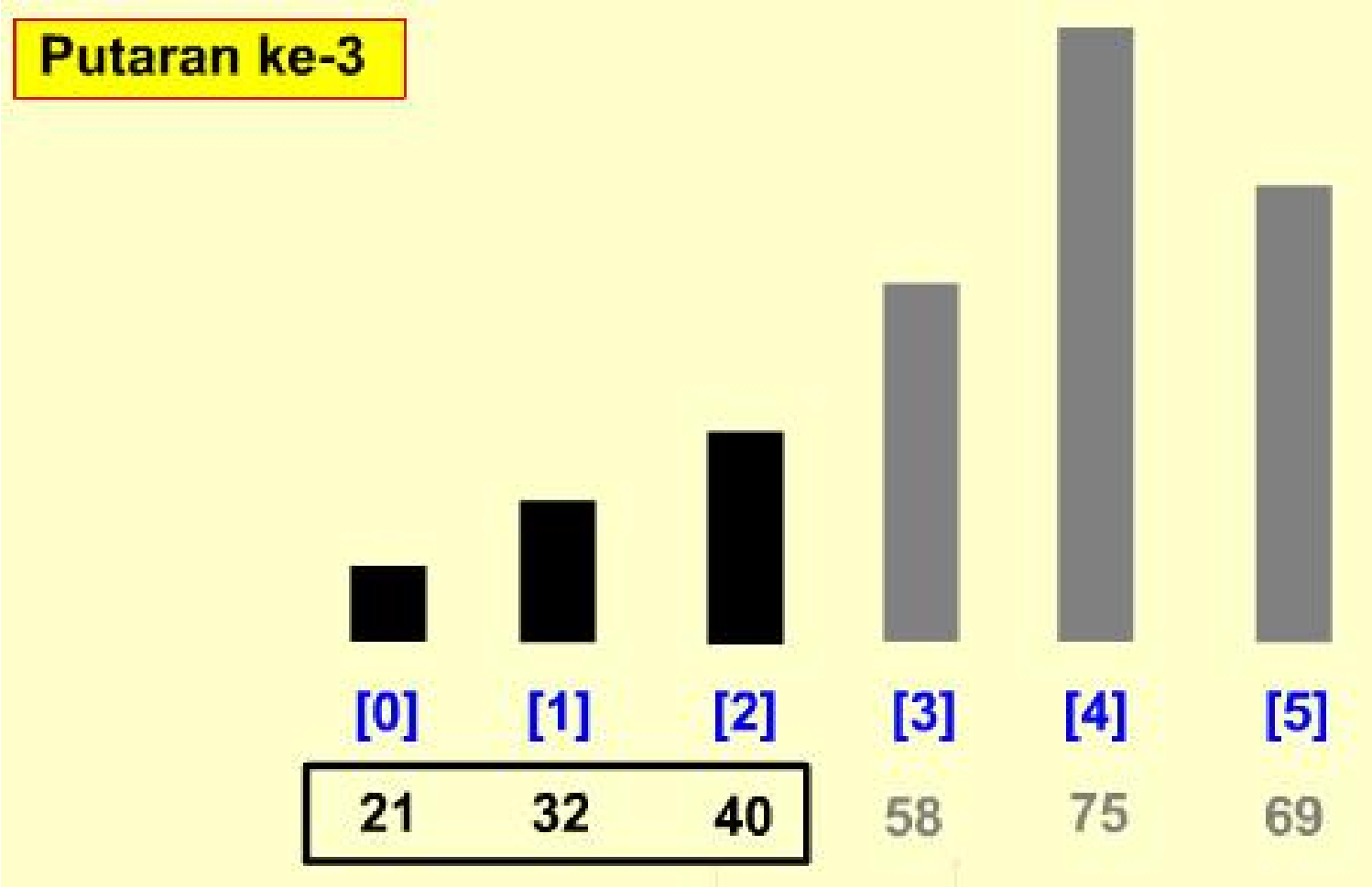

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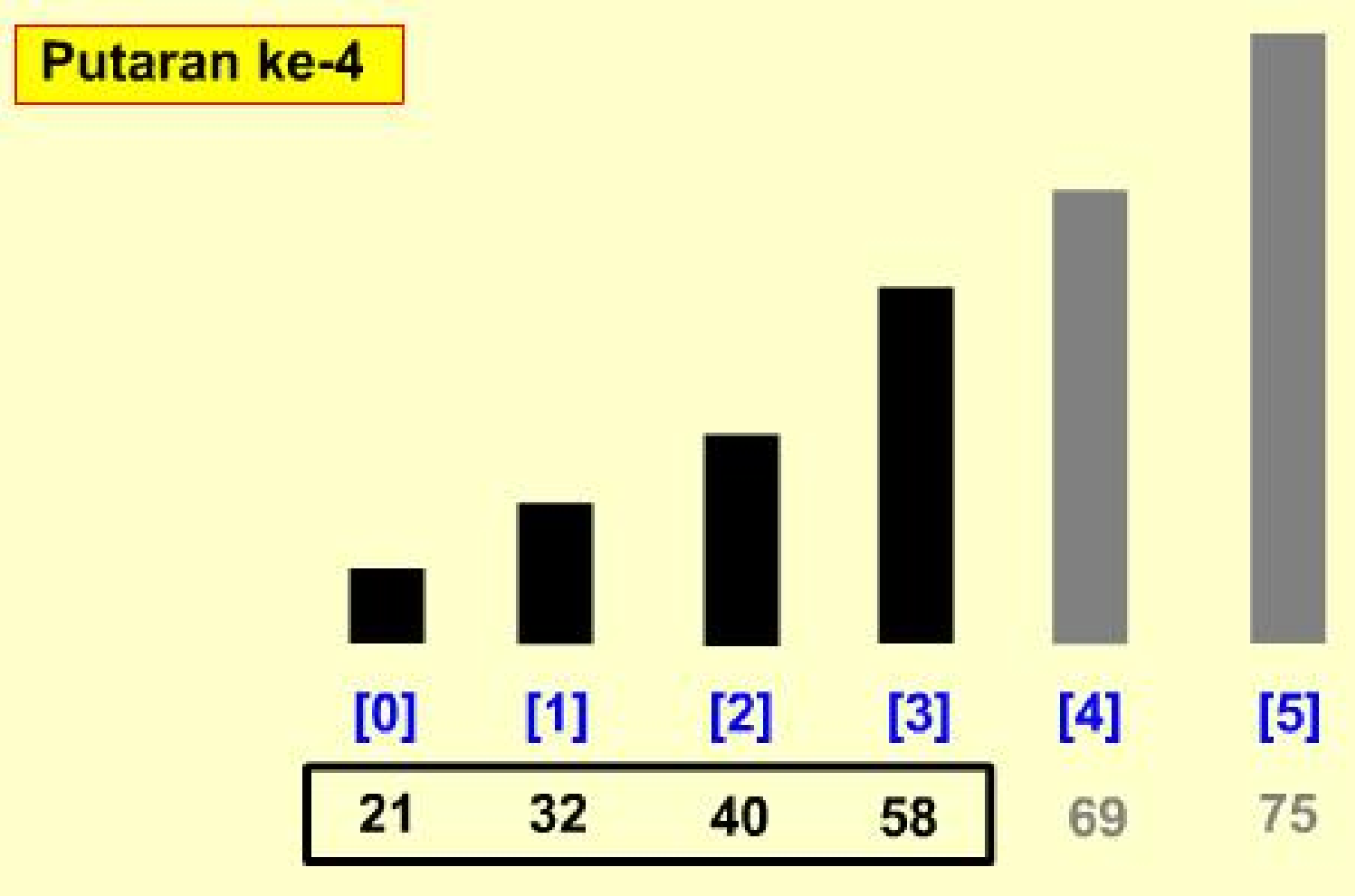

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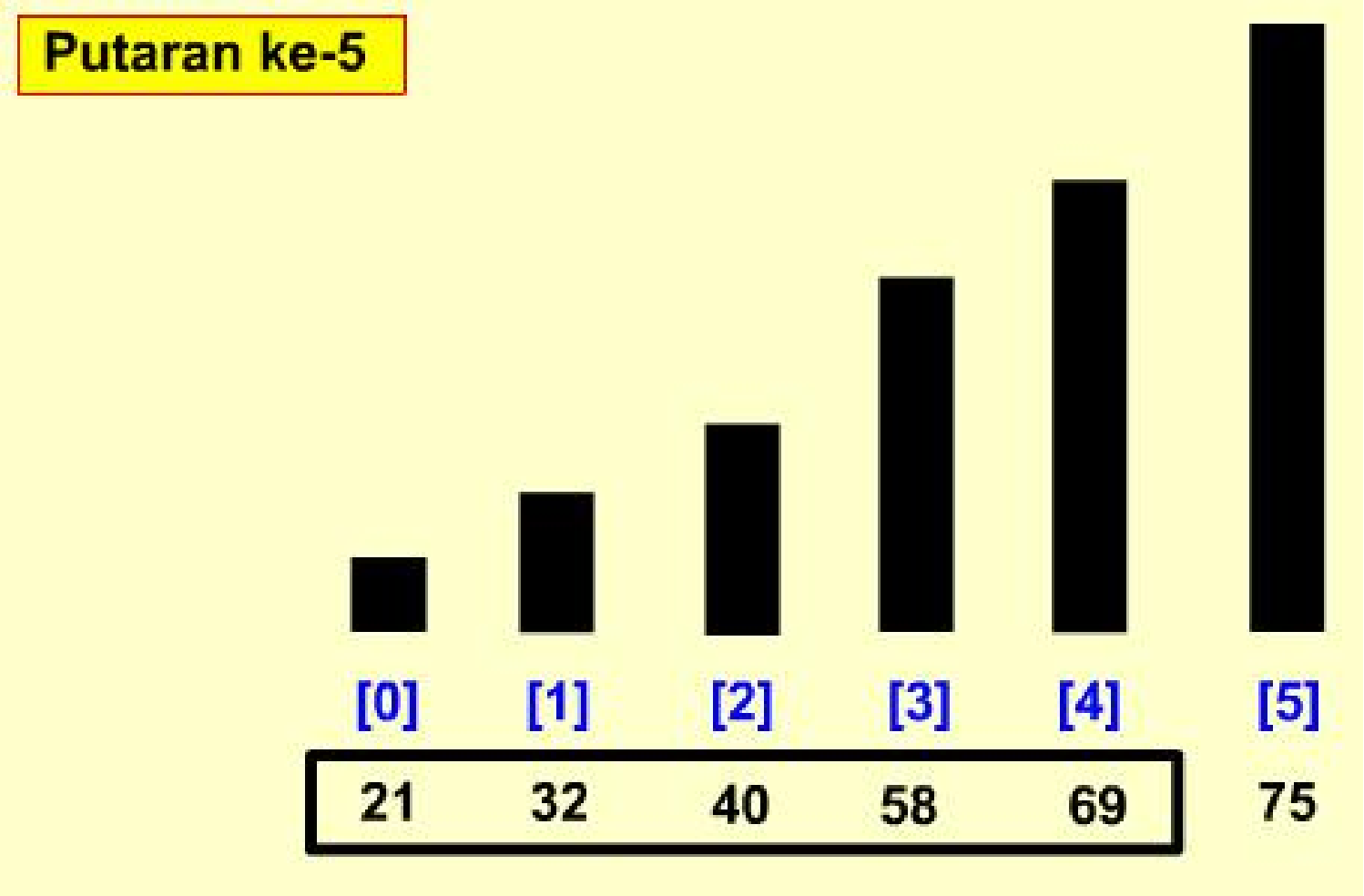
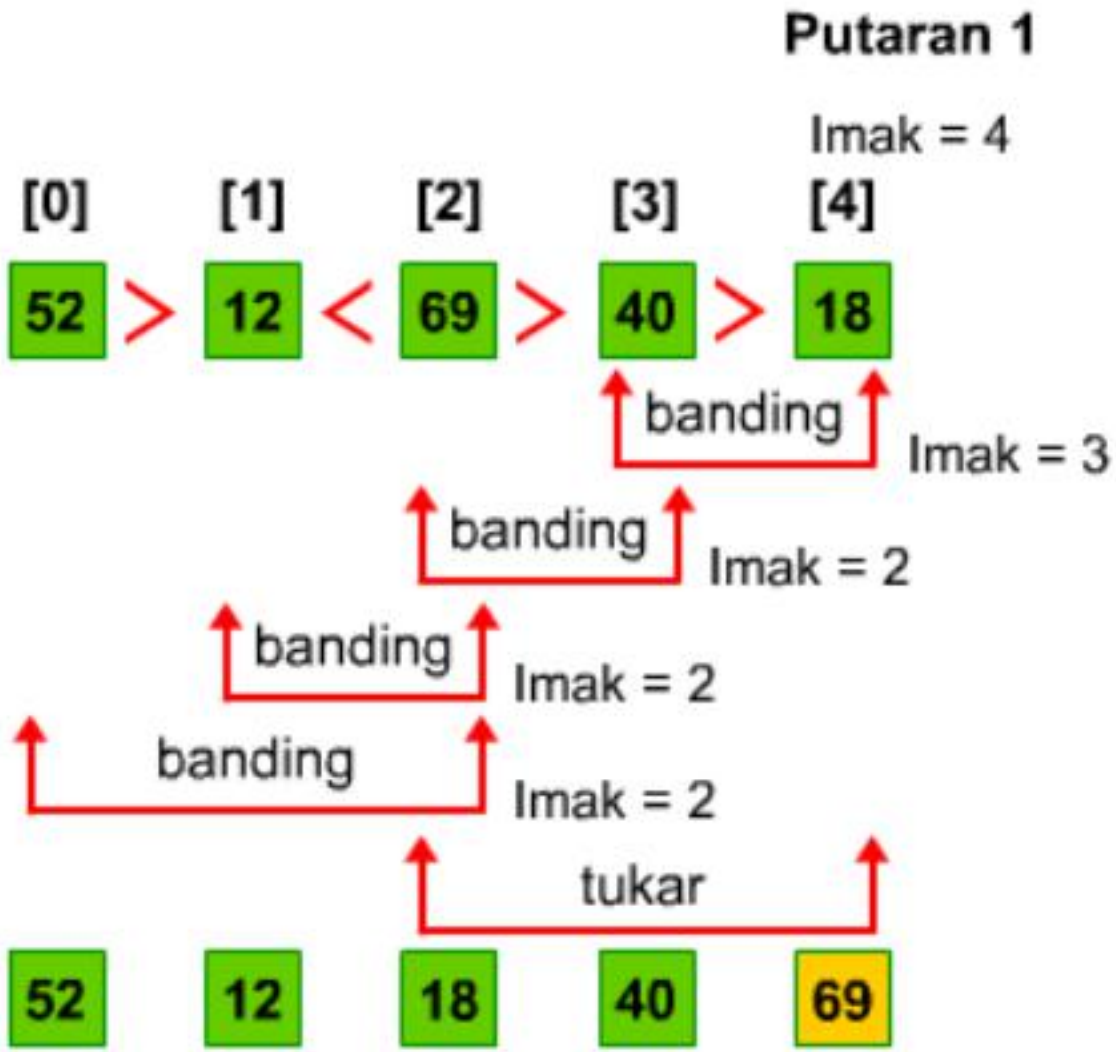


Selection Sort

Selection Sort

- Hampir sama dengan Bubble Sort
- Membandingkan salah satu elemen dengan semua elemen

Selection Sort



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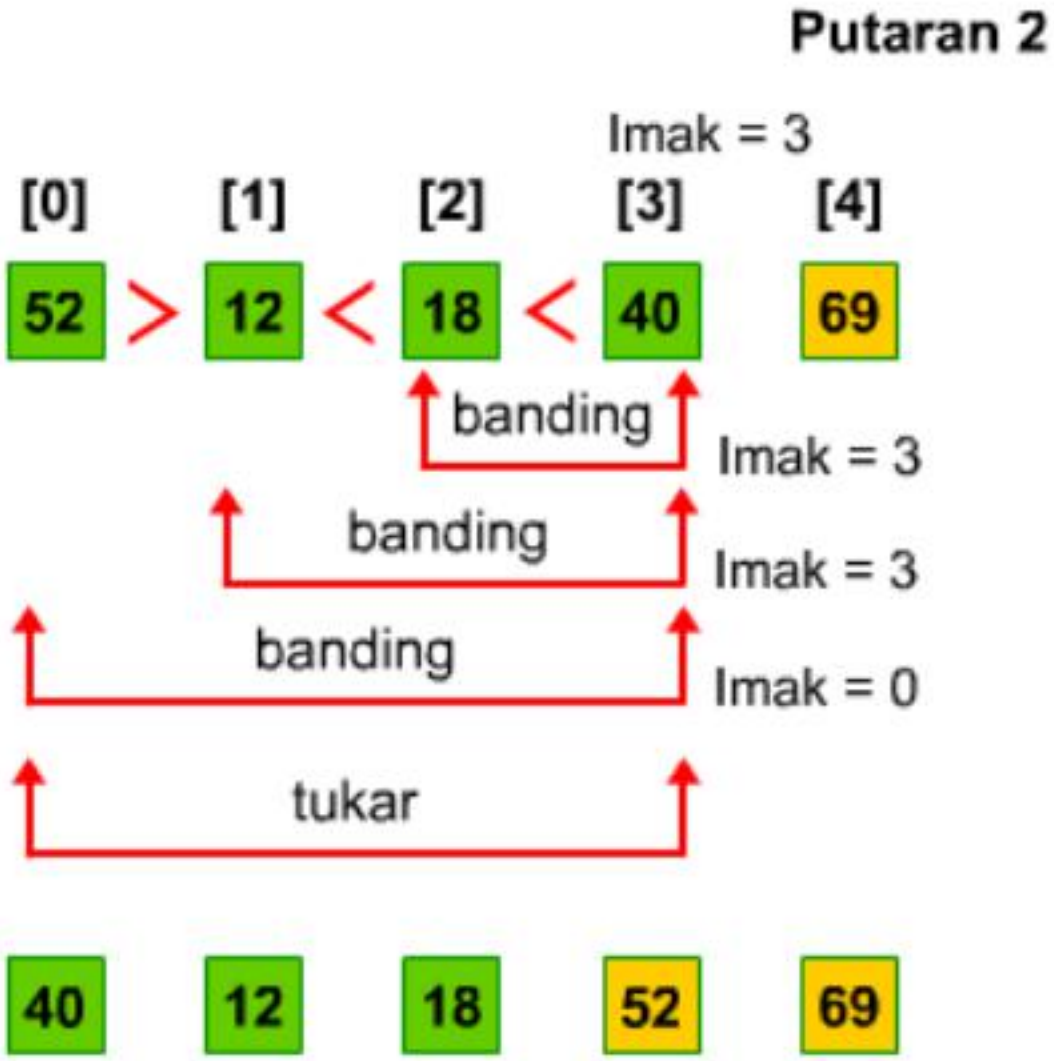

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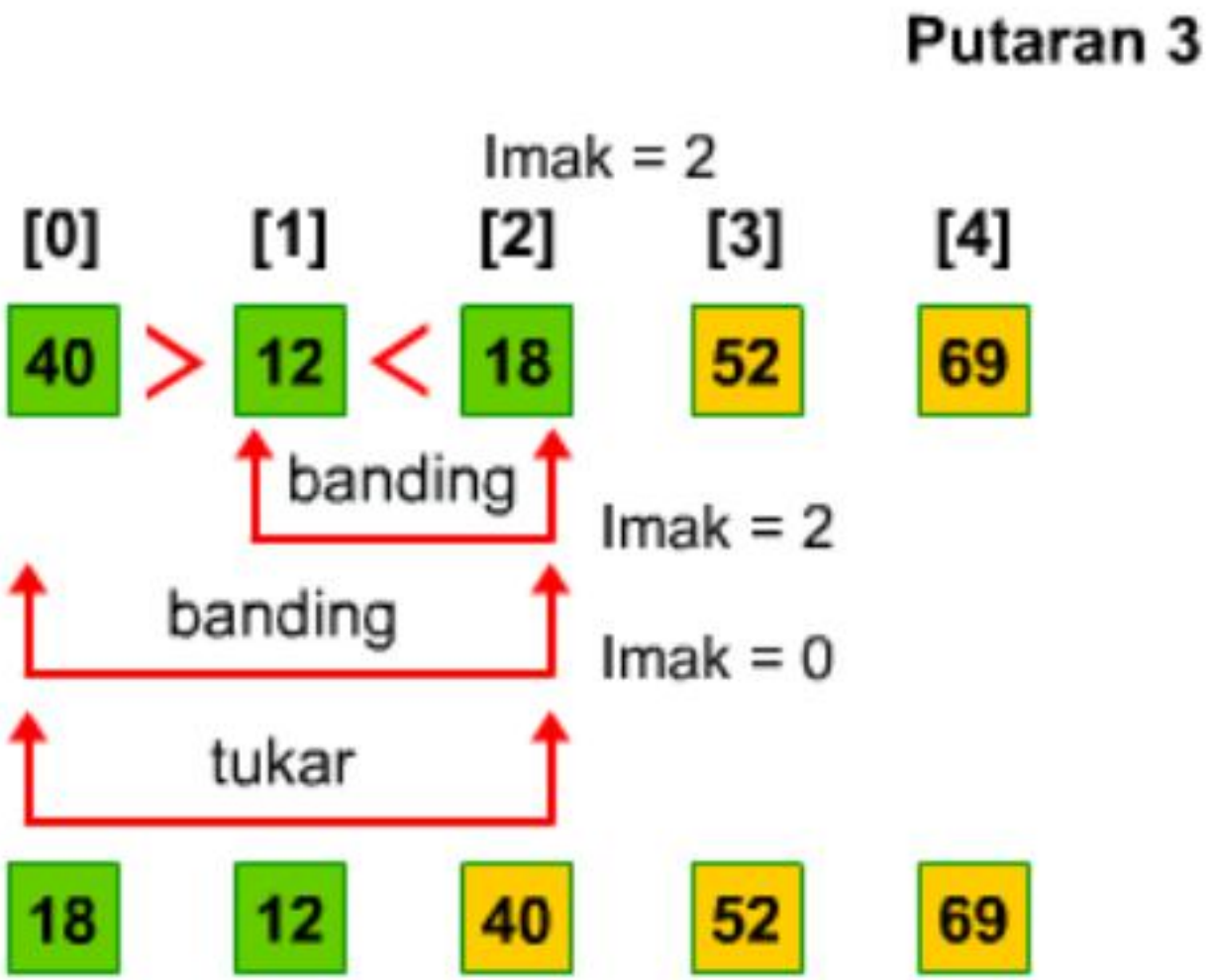

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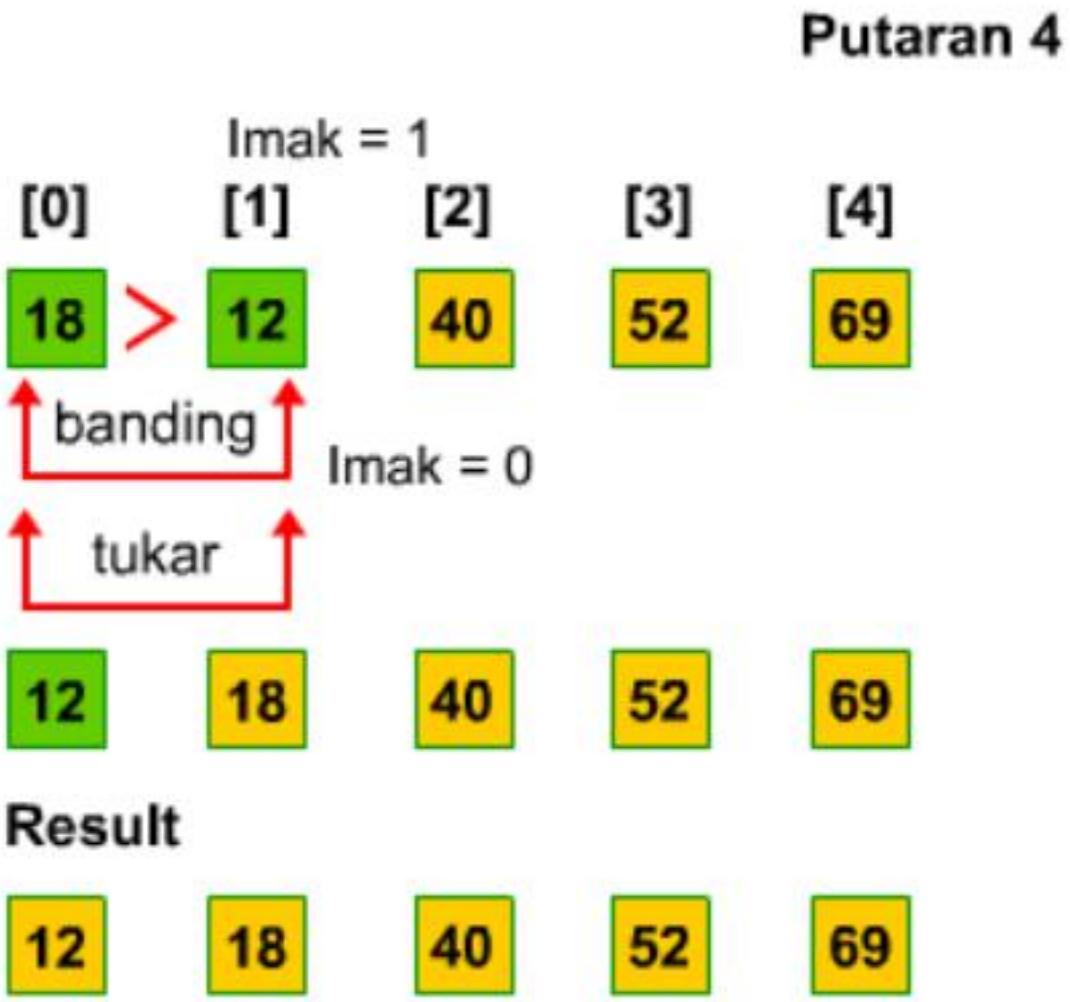


Insertion Sort

Insertion Sort

- Mirip dengan cara orang **mengurutkan** kartu, selembar demi selembar kartu diambil dan **disisipkan** (insert) ke tempat yang seharusnya.
- Pengurutan dimulai dari data ke-2 sampai dengan data terakhir, jika ditemukan data yang **lebih kecil**, maka akan ditempatkan (**diinsert**) diposisi yang seharusnya.
- Pada penyisipan elemen, maka elemen-elemen lain akan bergeser ke belakang.
- Nilai dibandingkan dengan index sebelumnya
- Setiap putaran tidak menghasilkan nilai terbesar atau terkecil

Insertion Sort

- Proses 1

0	1	2	3	4	5
22	10	15	3	8	2
10	22	15	3	8	2

- Proses 2

0	1	2	3	4	5
10	22	15	3	8	2
10	15	22	3	8	2

Insertion Sort

- Proses 3

0	1	2	3	4	5
10	15	22	3	8	2
10	15	3	22	8	2
10	3	15	22	8	2
3	10	15	22	8	2

Insertion Sort

- Proses 4

0	1	2	3	4	5
3	10	15	22	8	2
3	10	15	8	22	2
3	10	8	15	22	2
3	8	10	15	22	2

Insertion Sort

- Proses 5

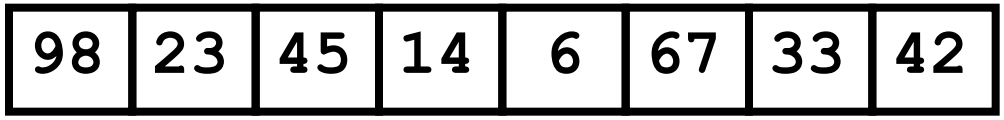
0	1	2	3	4	5
3	8	10	15	22	2
3	8	10	15	2	22
3	8	10	2	15	22
3	8	2	10	15	22
3	2	8	10	15	22
2	3	8	10	15	22

Advanced Learning

Mergesort

- Merupakan algoritma divide-and-conquer (membagi dan menyelesaikan)
- Membagi array menjadi dua bagian sampai subarray hanya berisi satu elemen
- Mengabungkan solusi sub-problem :
  - Membandingkan elemen pertama subarray
  - Memindahkan elemen terkecil dan meletakkannya ke array hasil
  - Lanjutkan Proses sampai semua elemen berada pada array hasil

Mergesort



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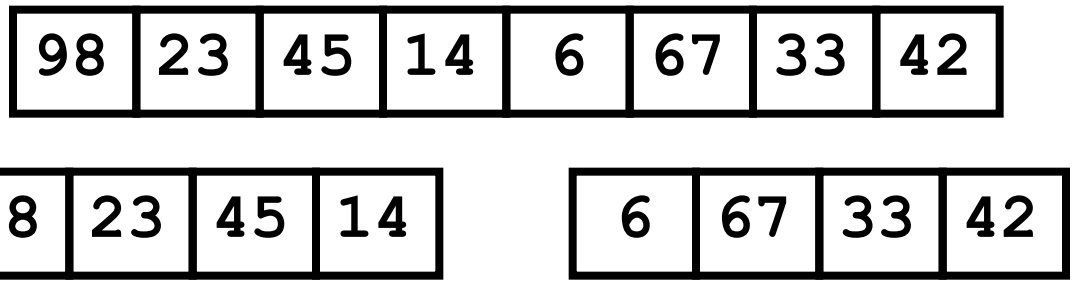

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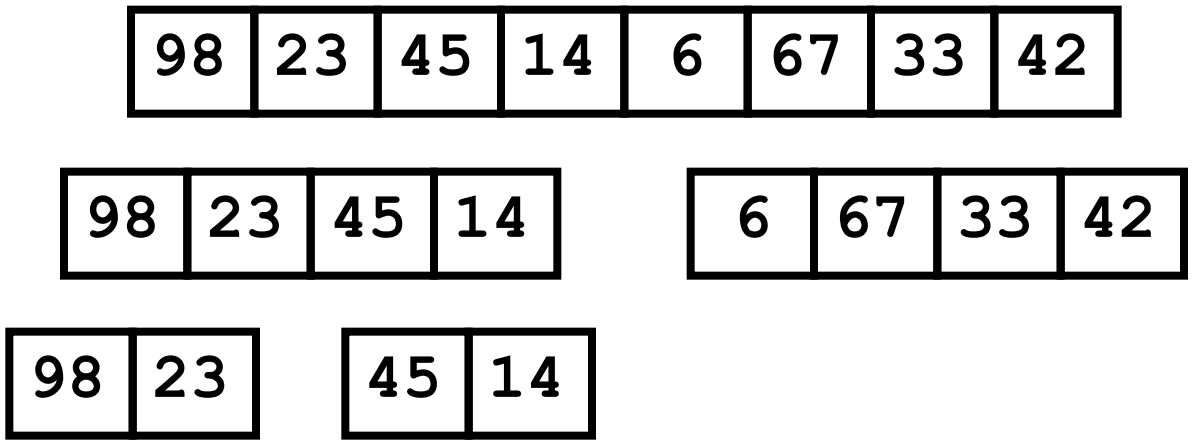

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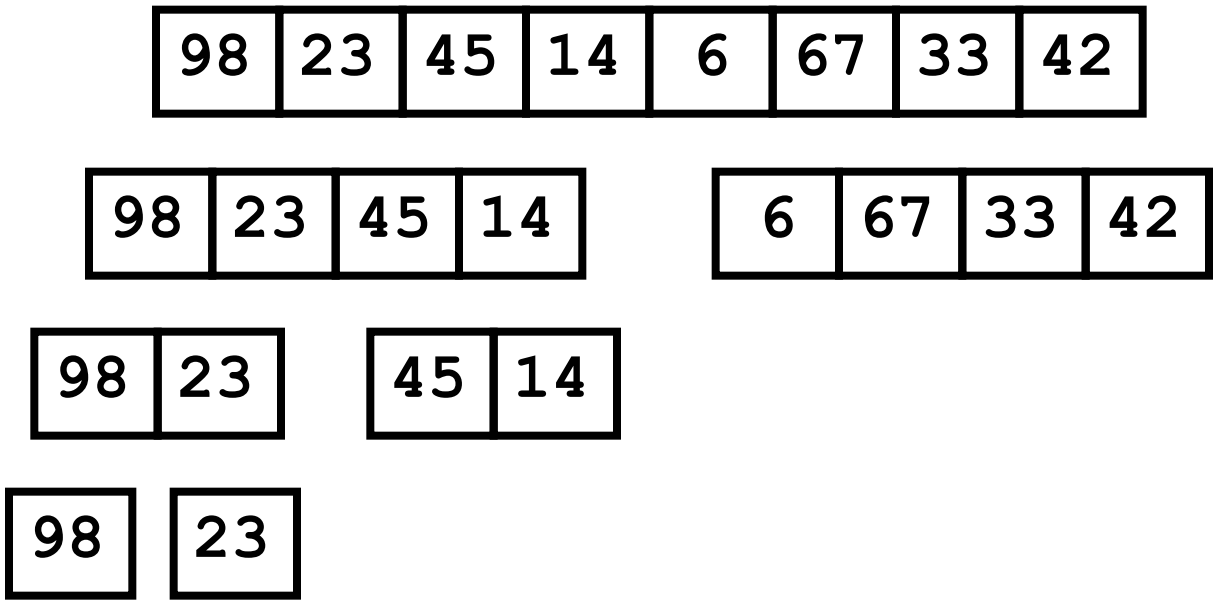

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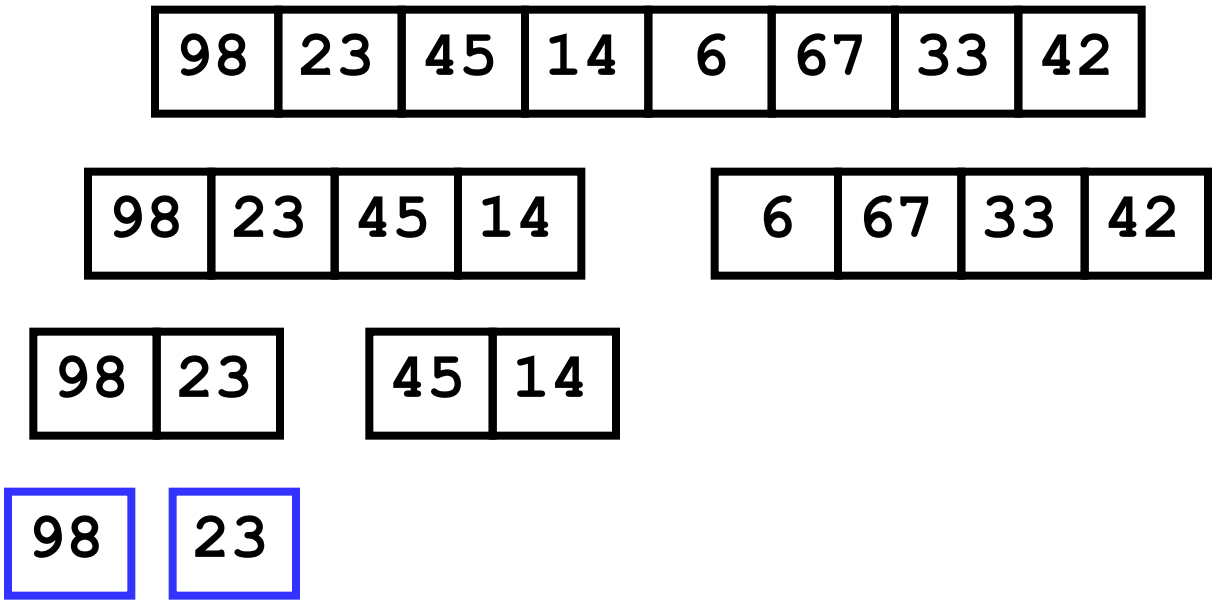

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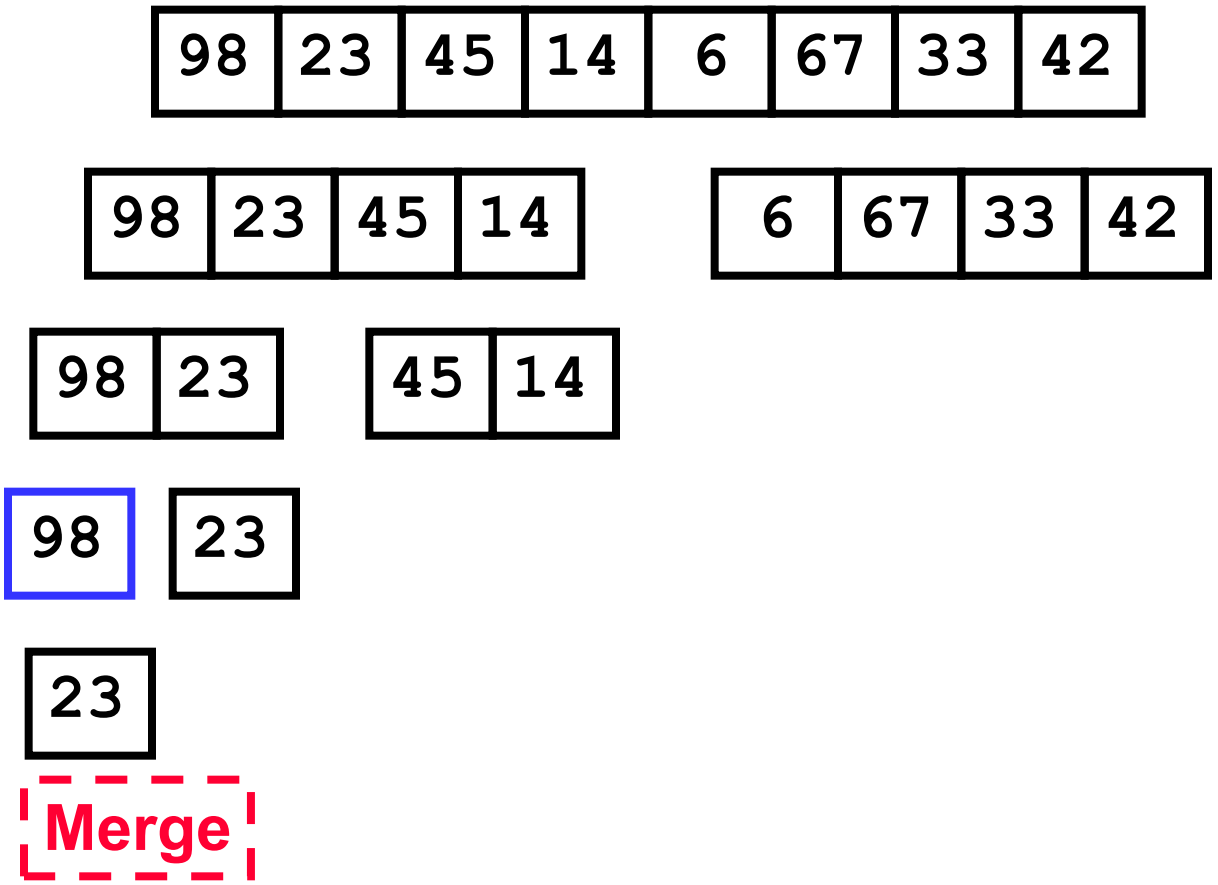

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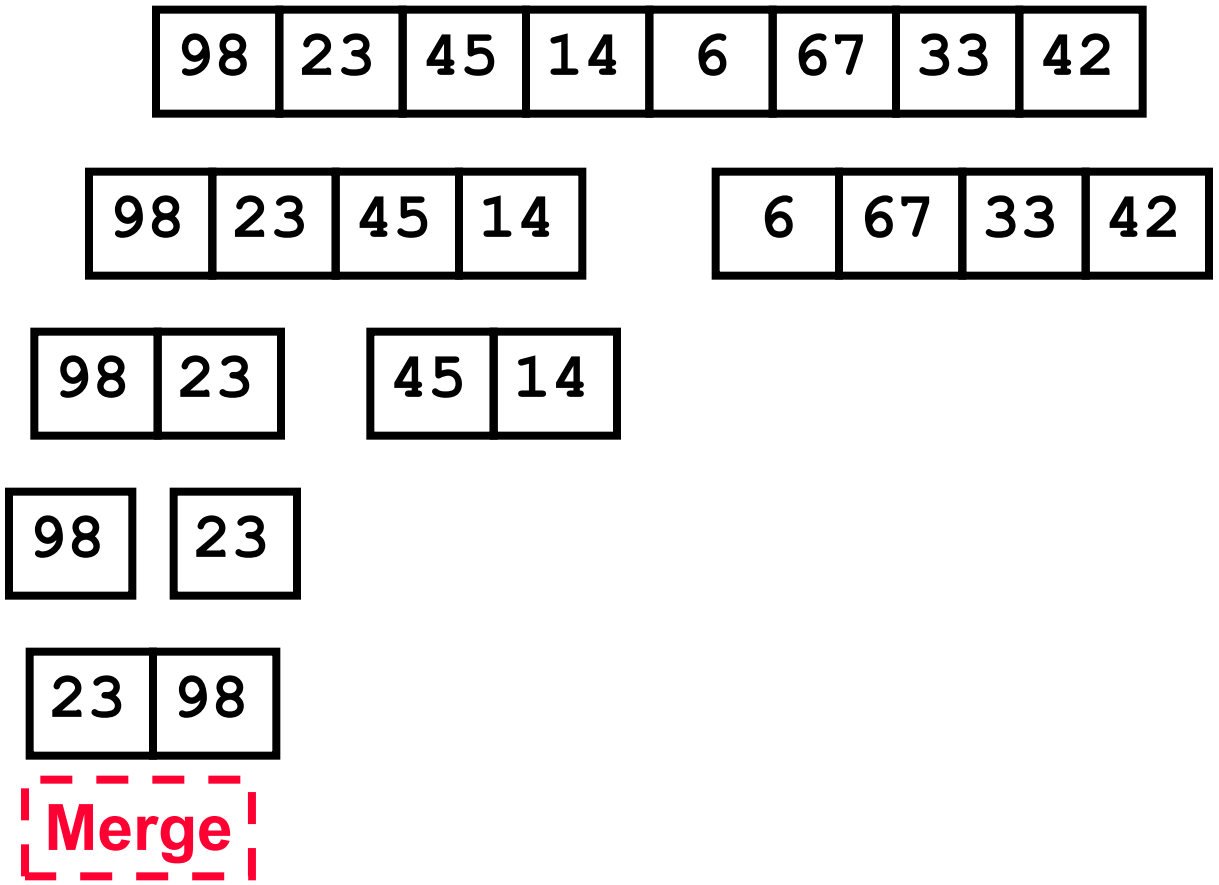
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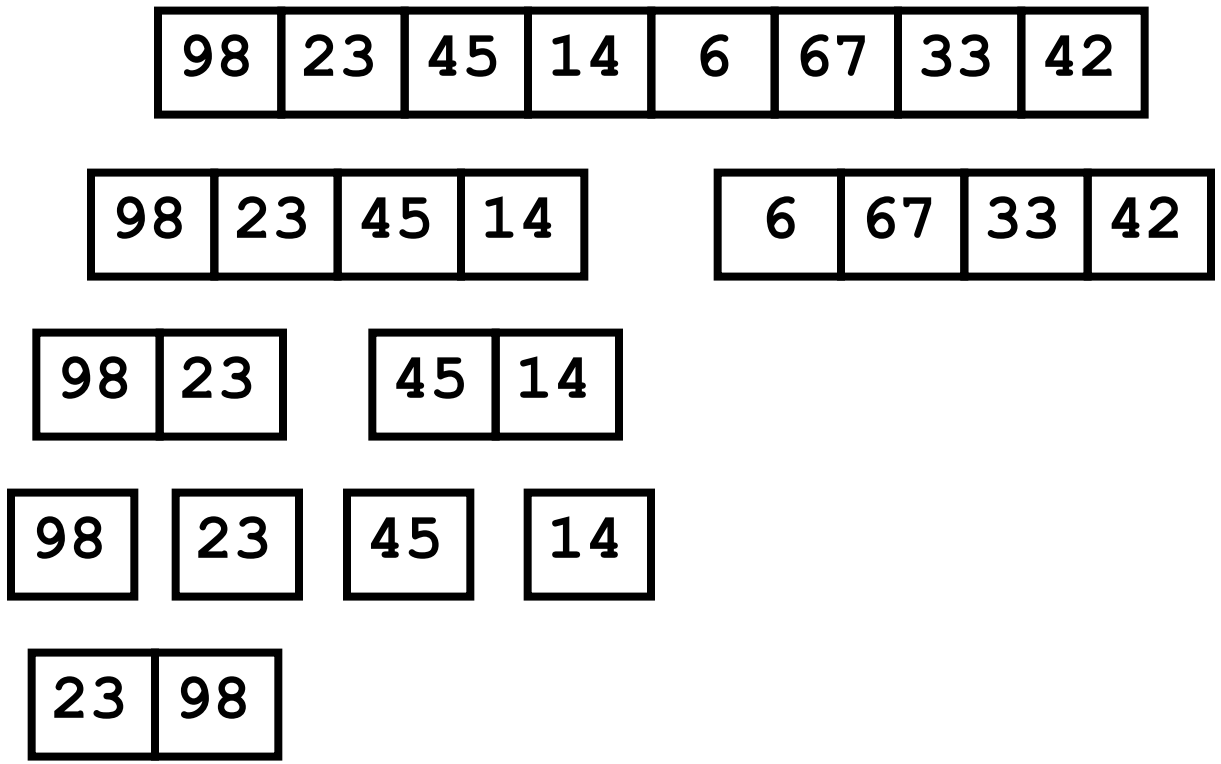
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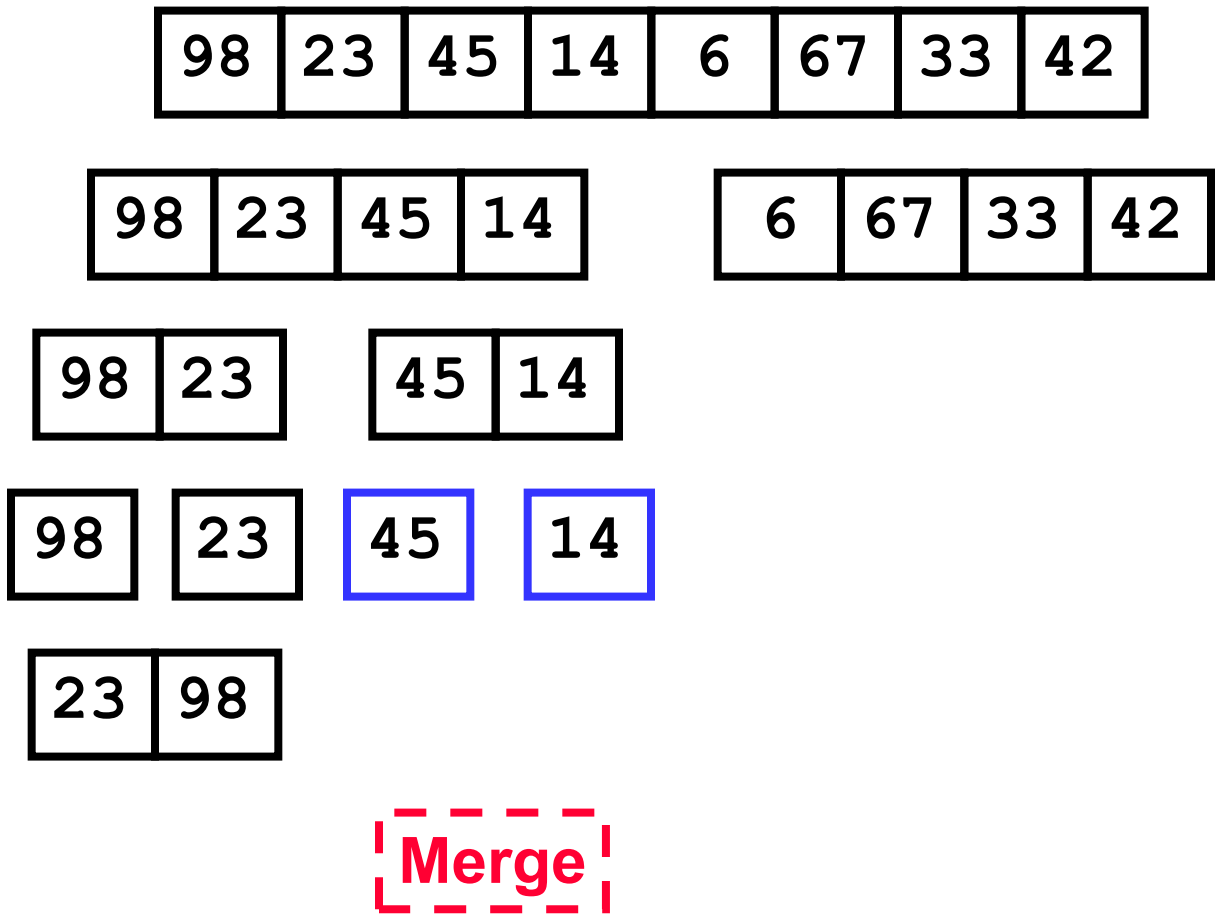
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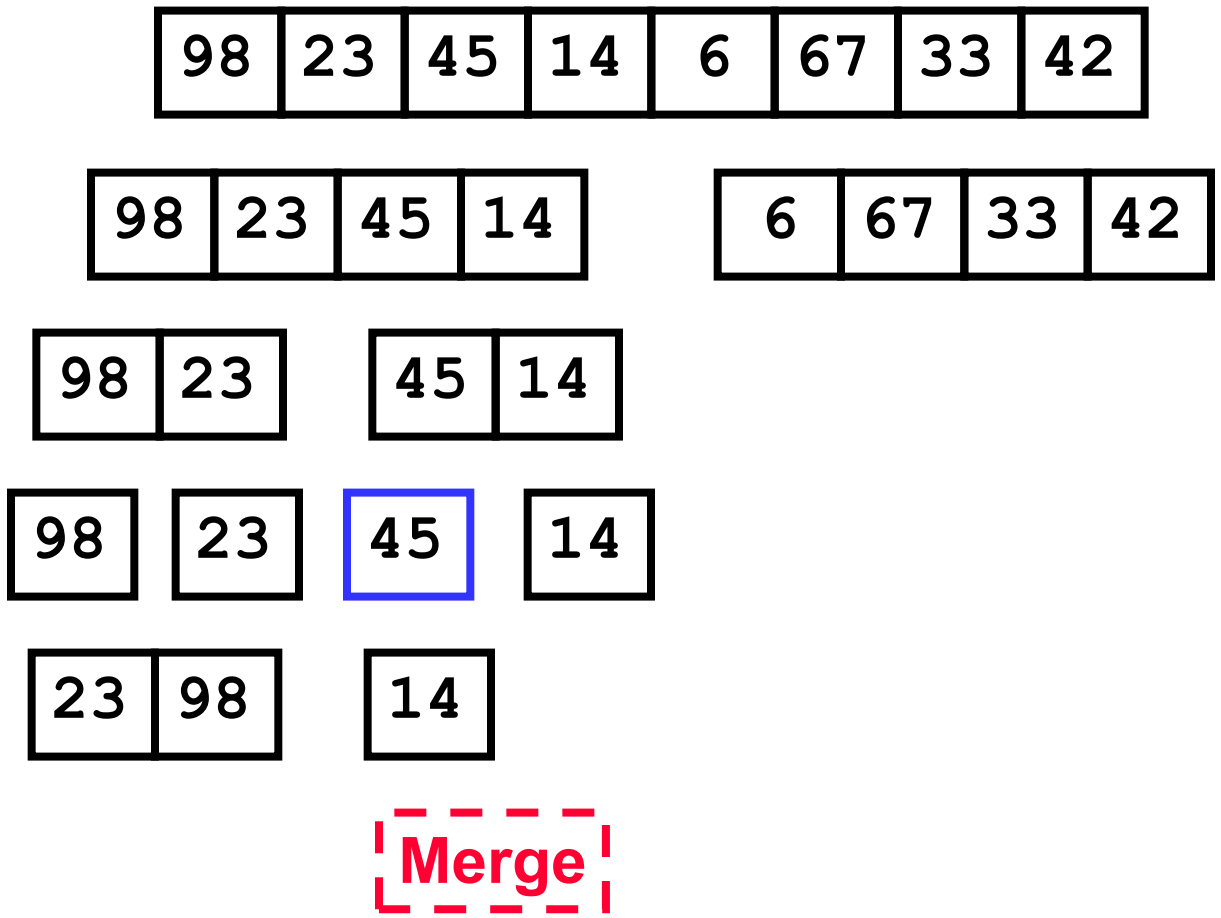
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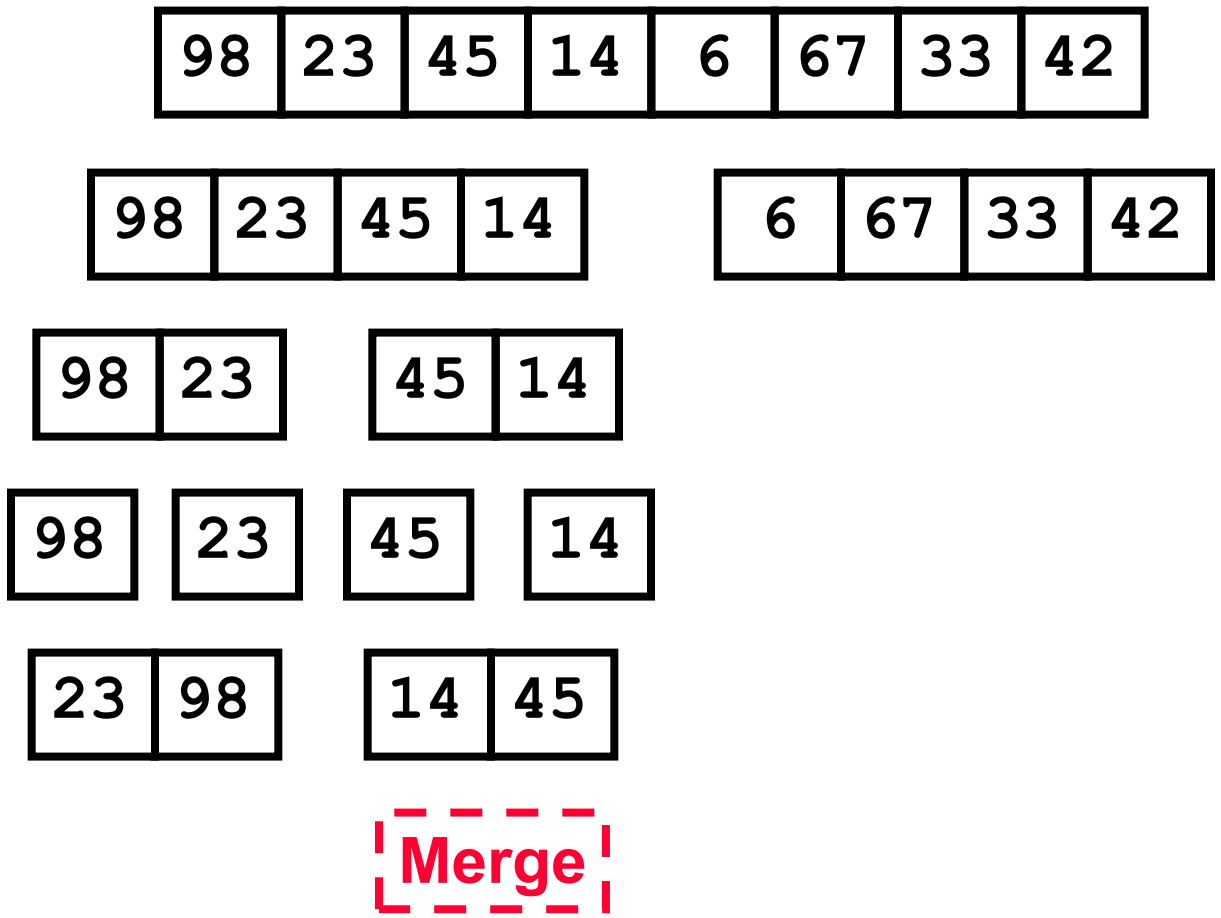
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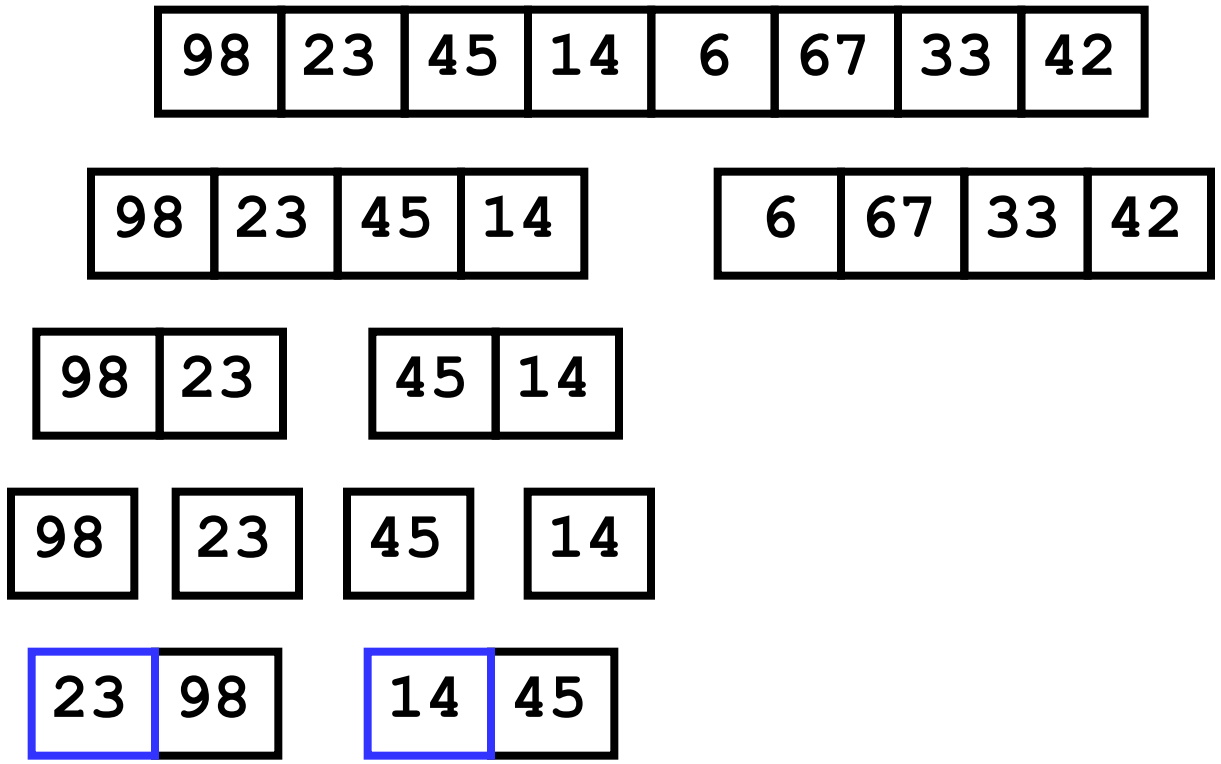
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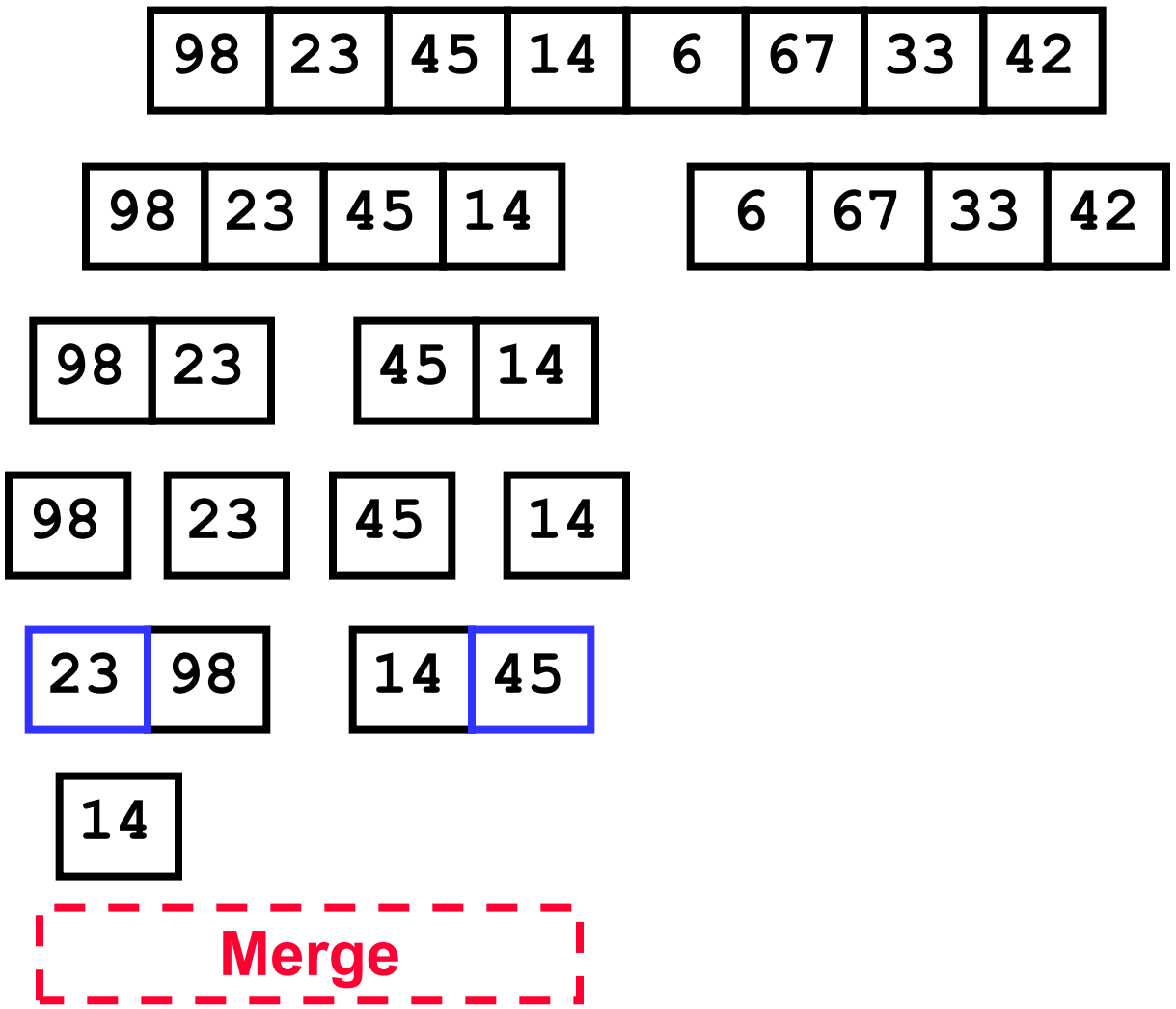
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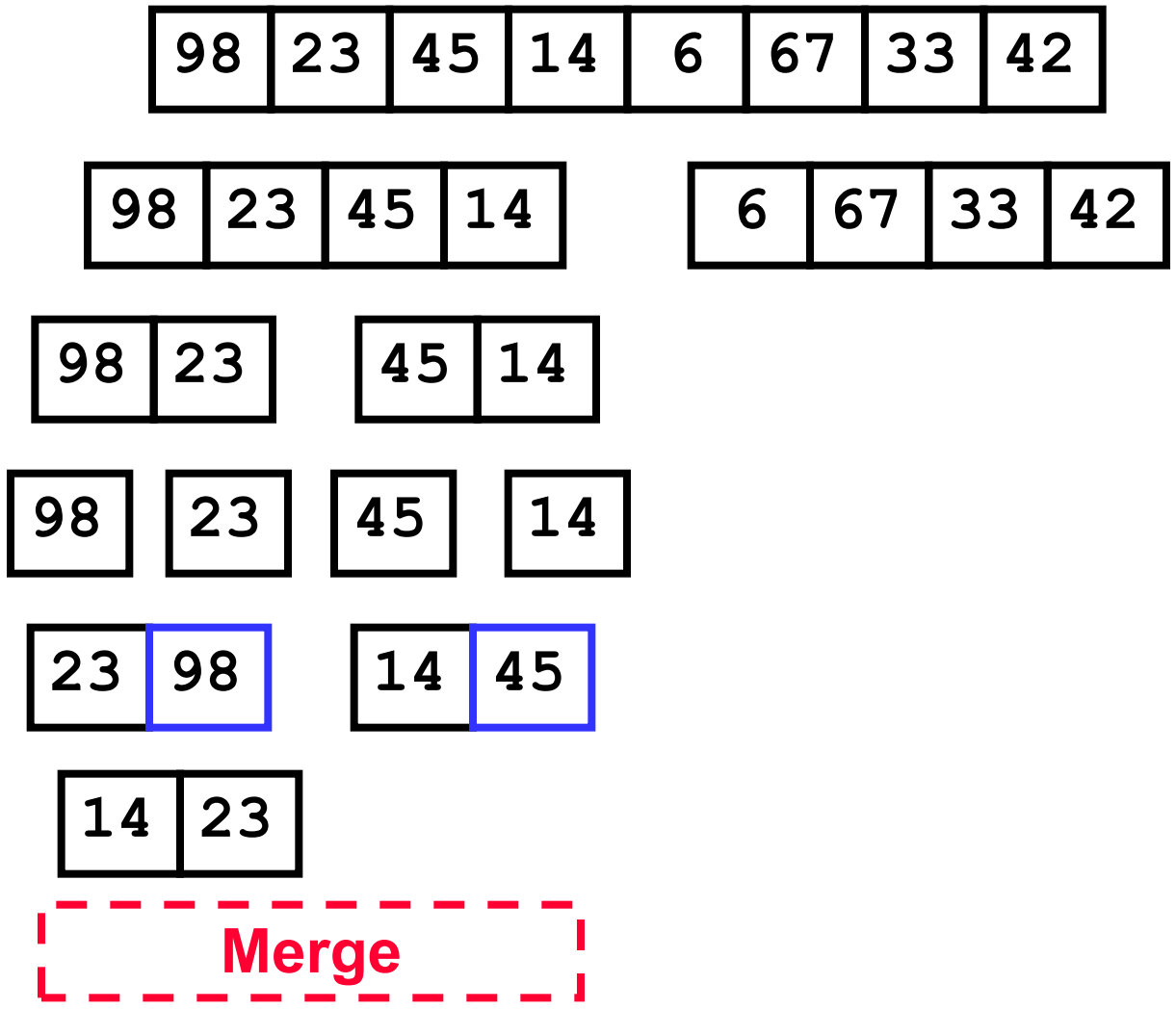
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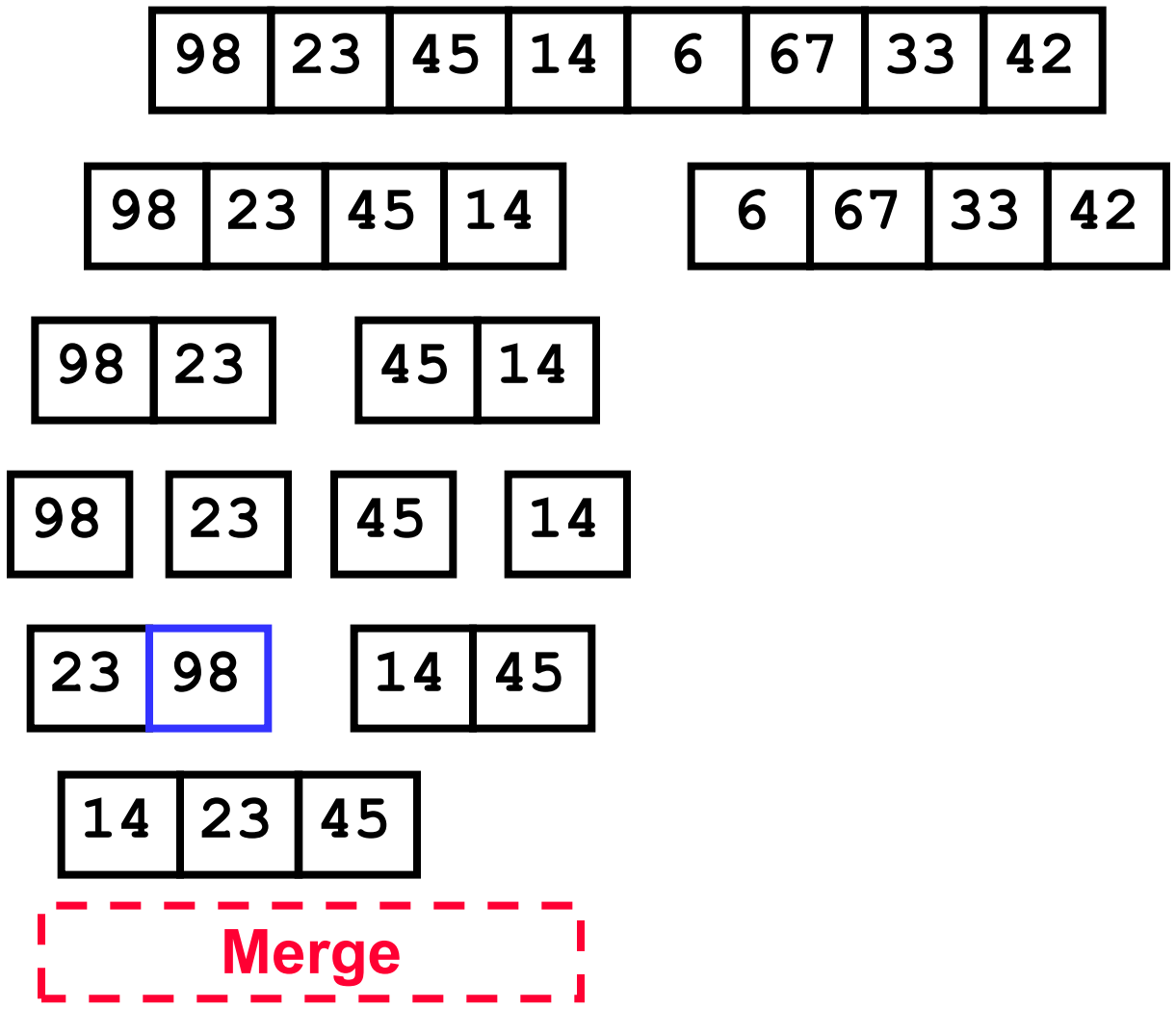
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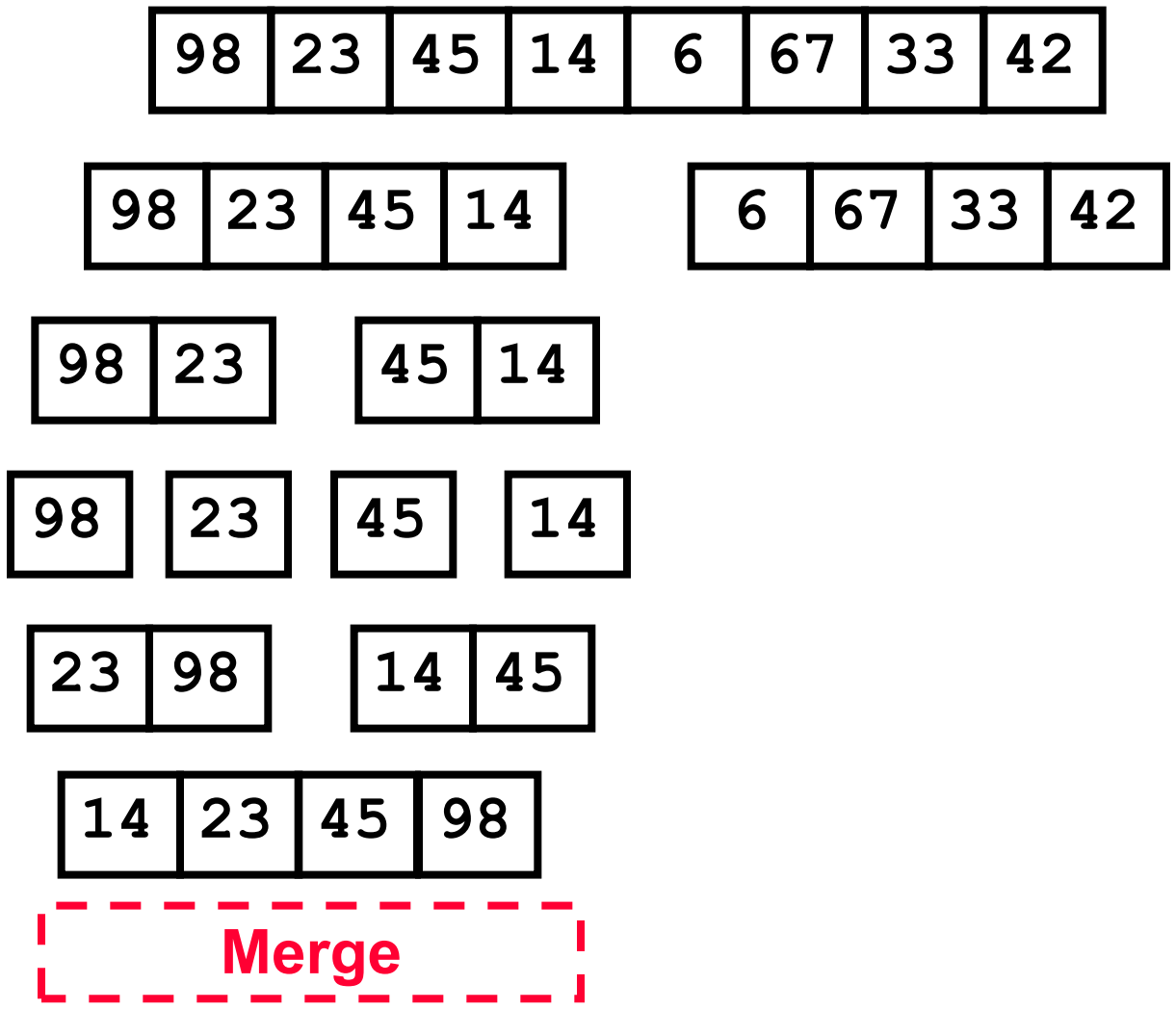
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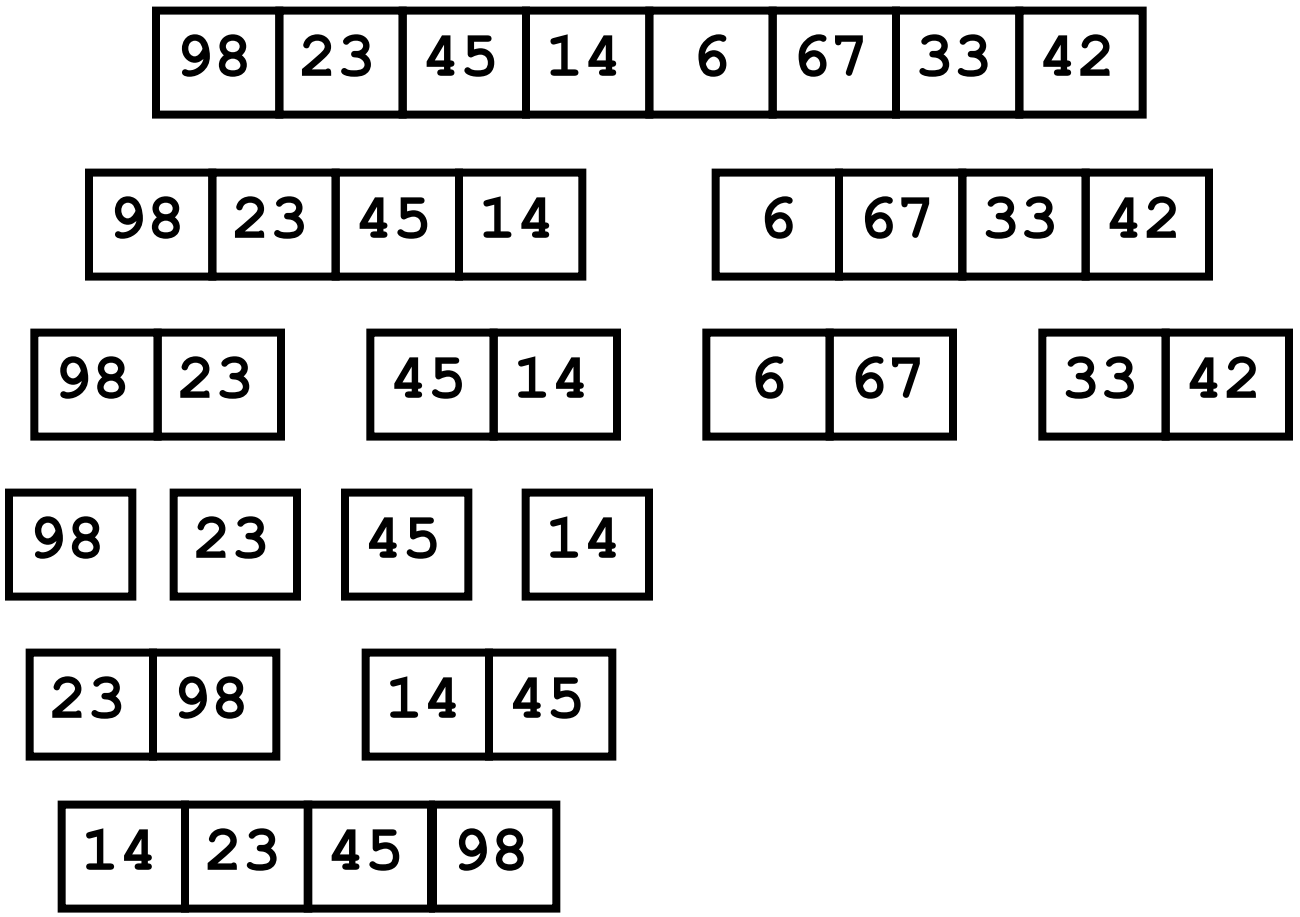
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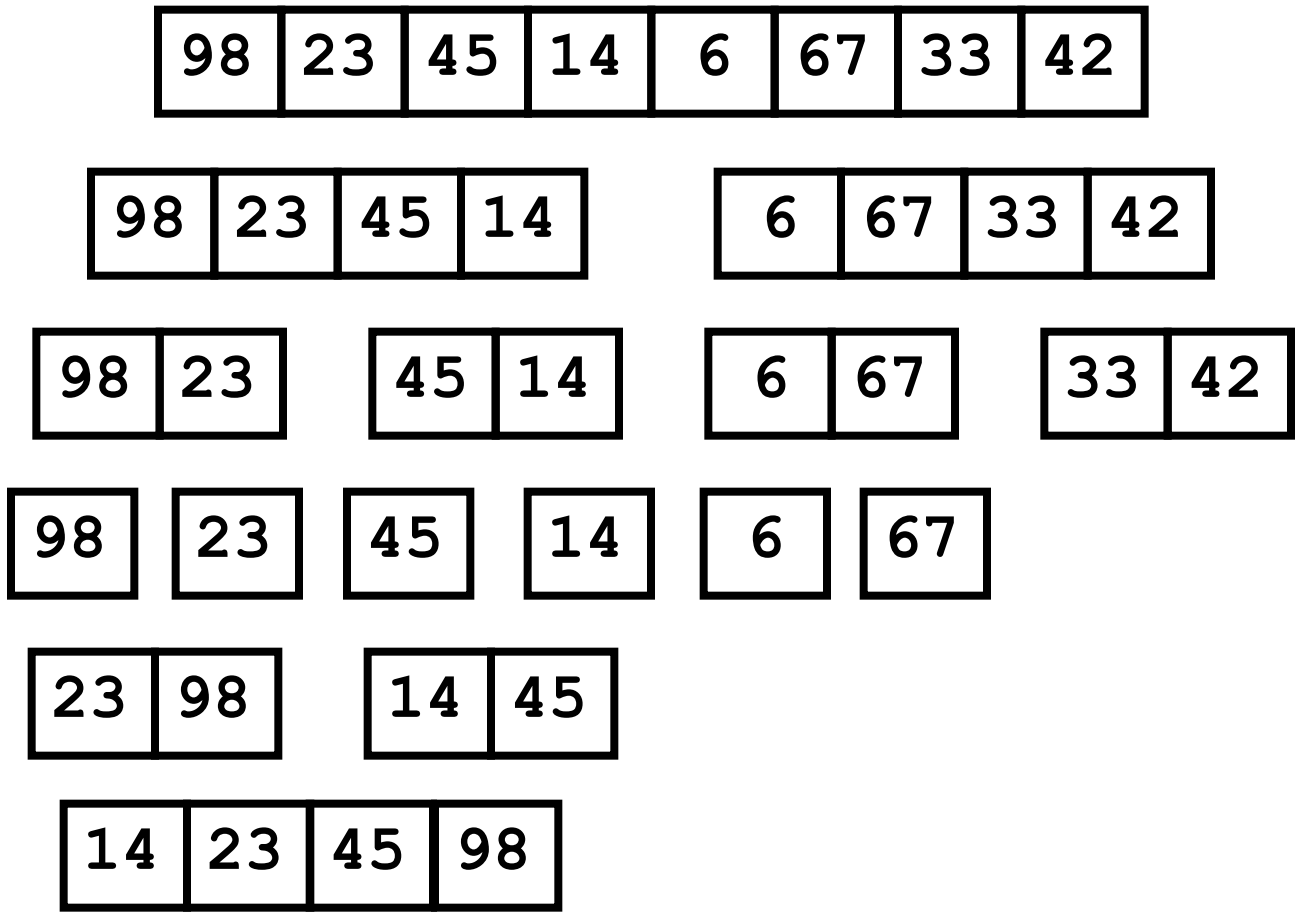
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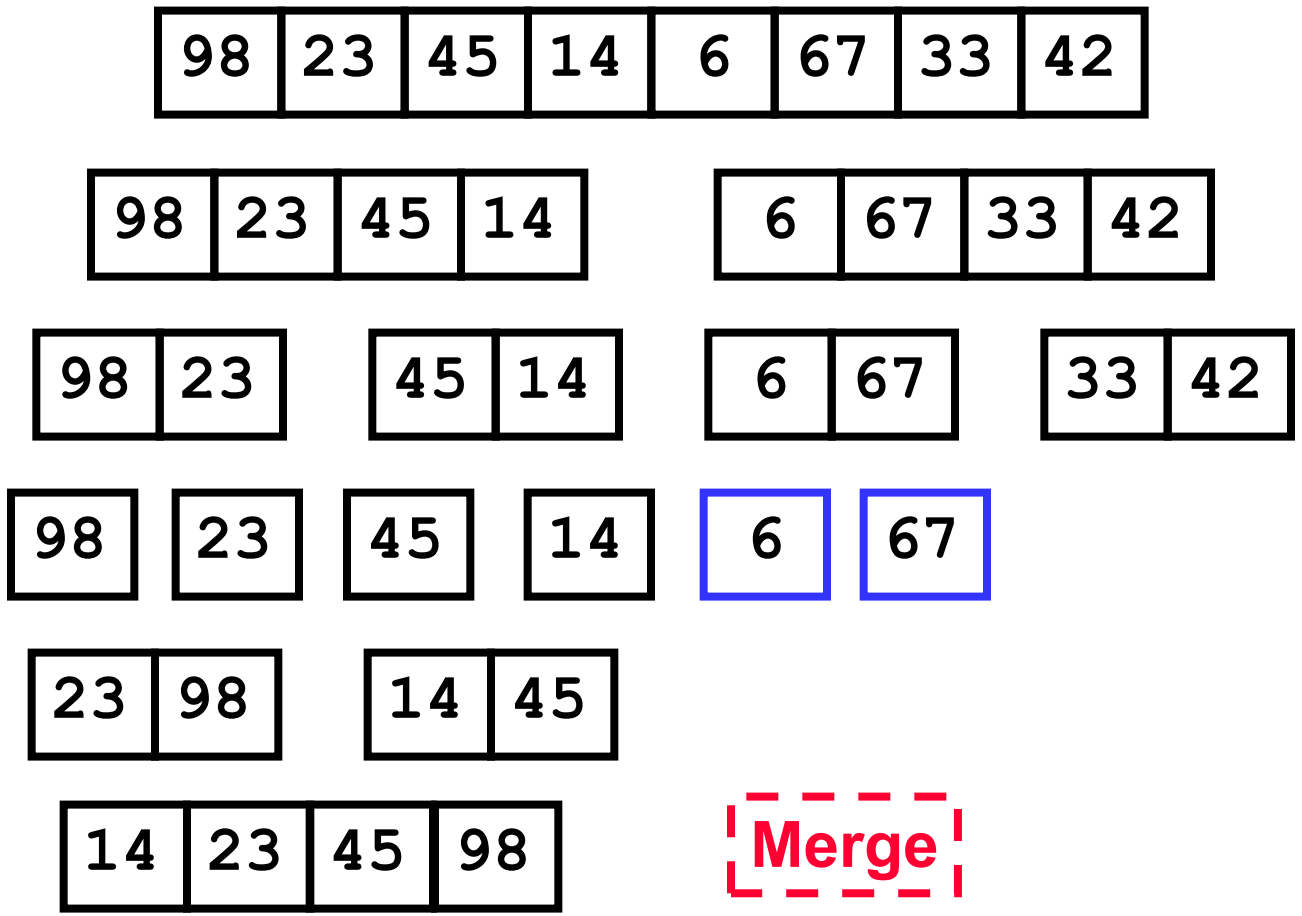
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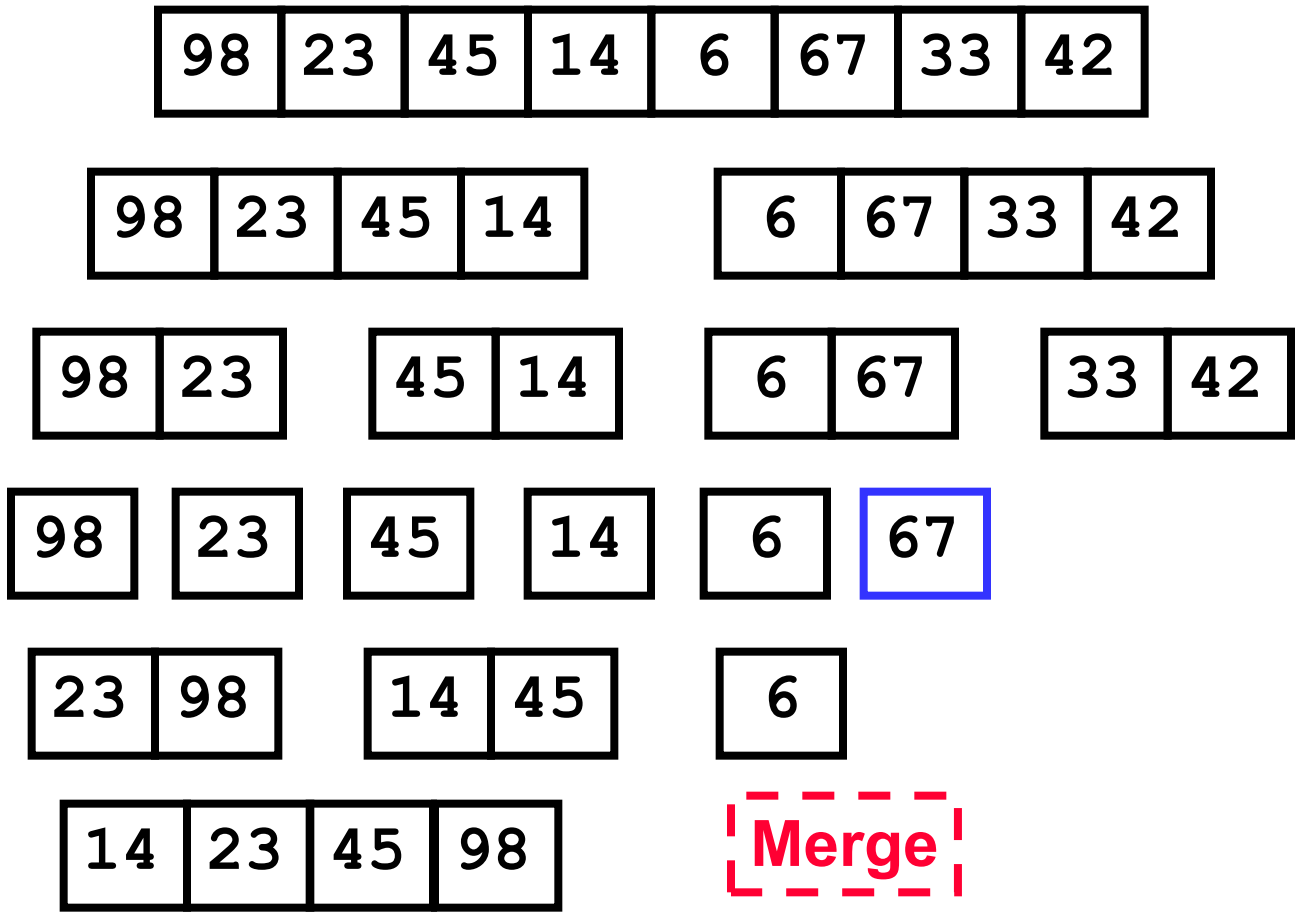
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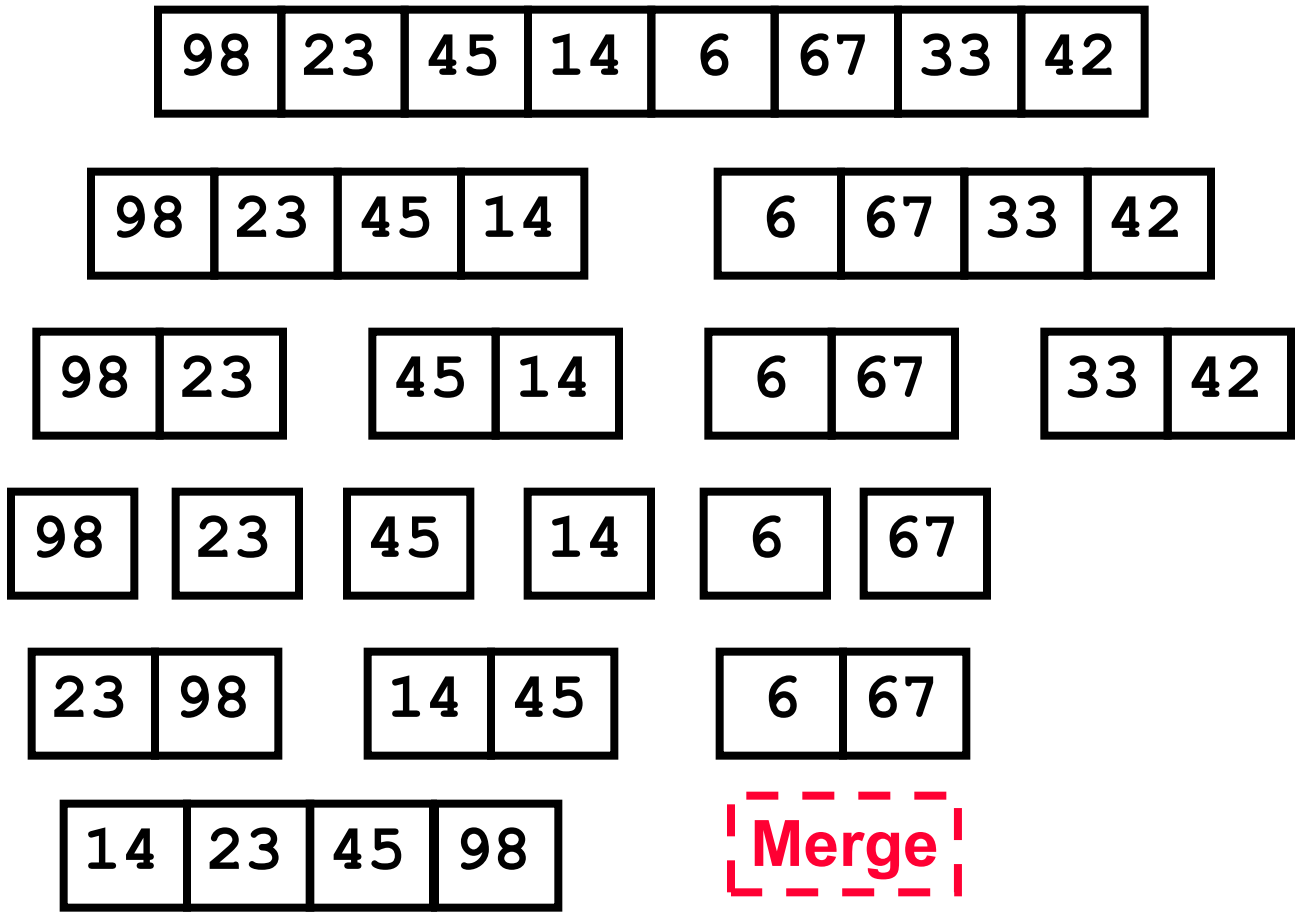
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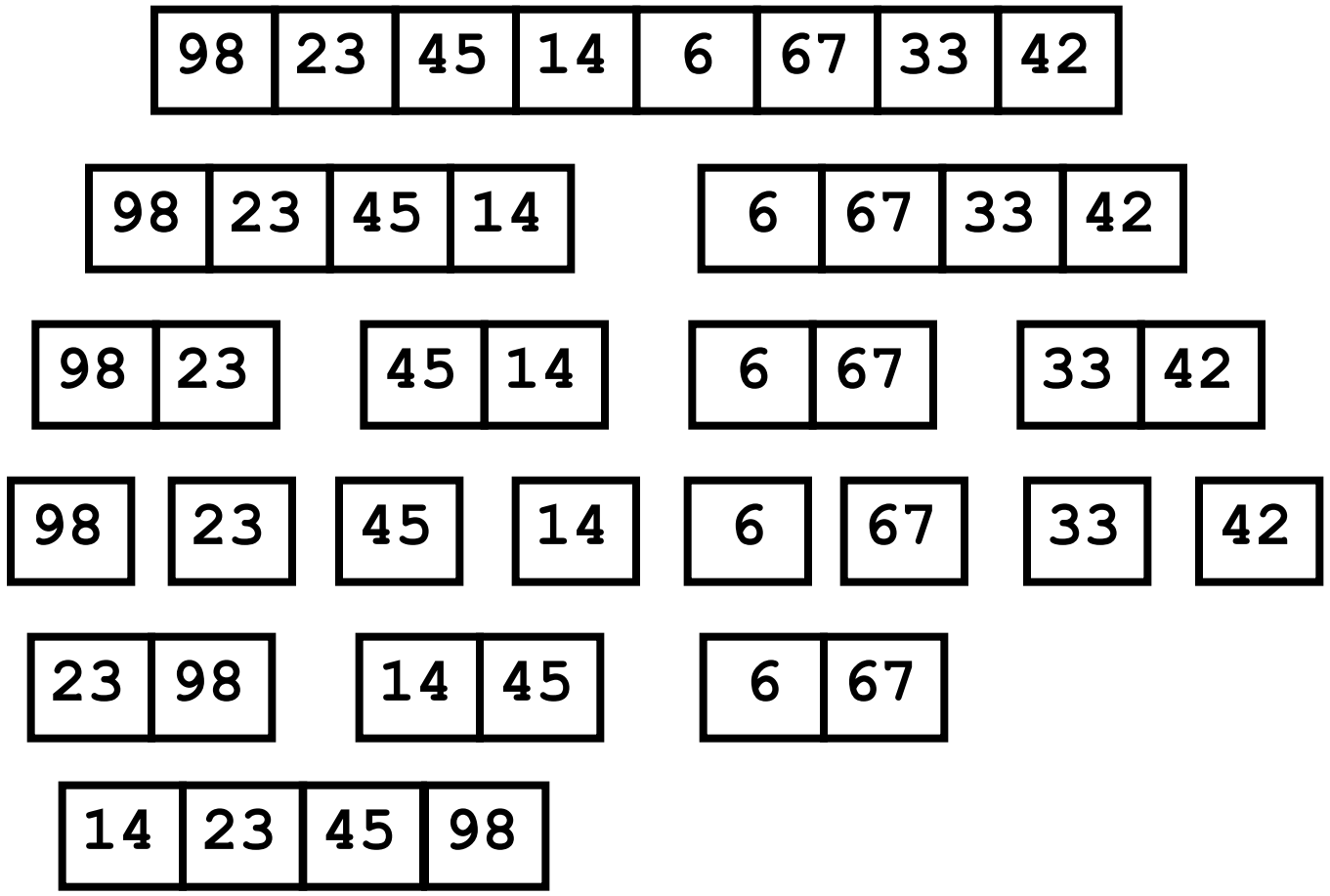
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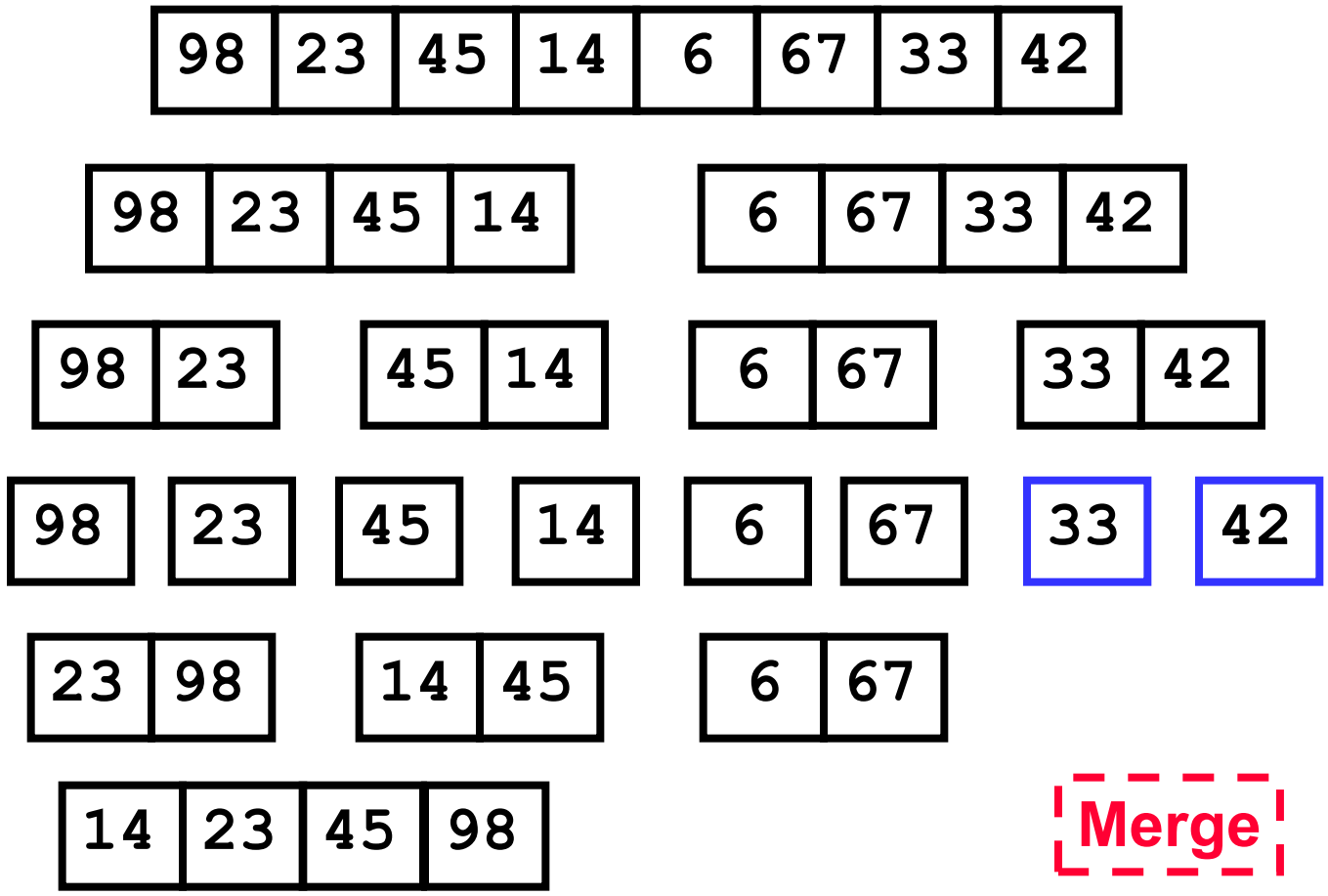
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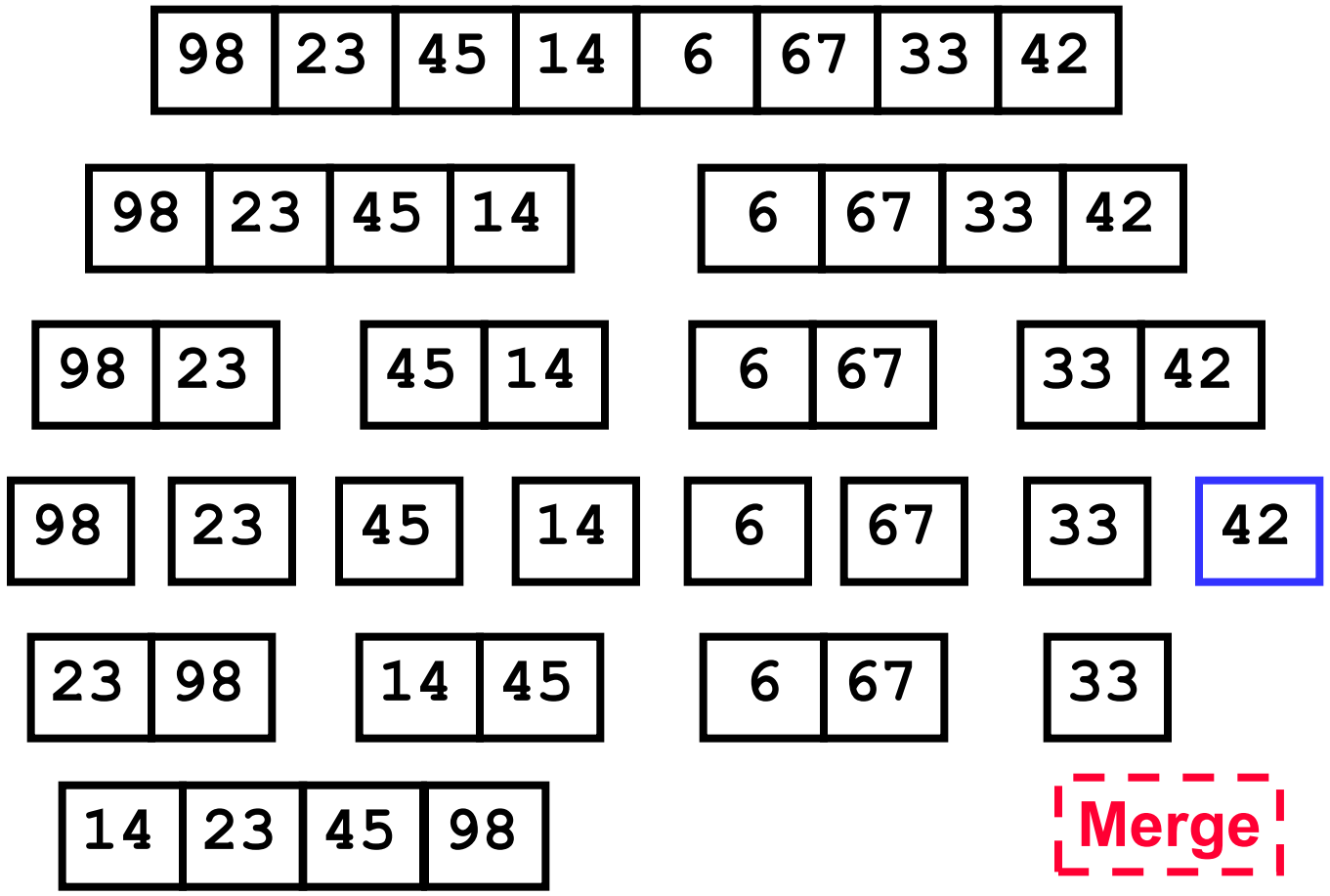
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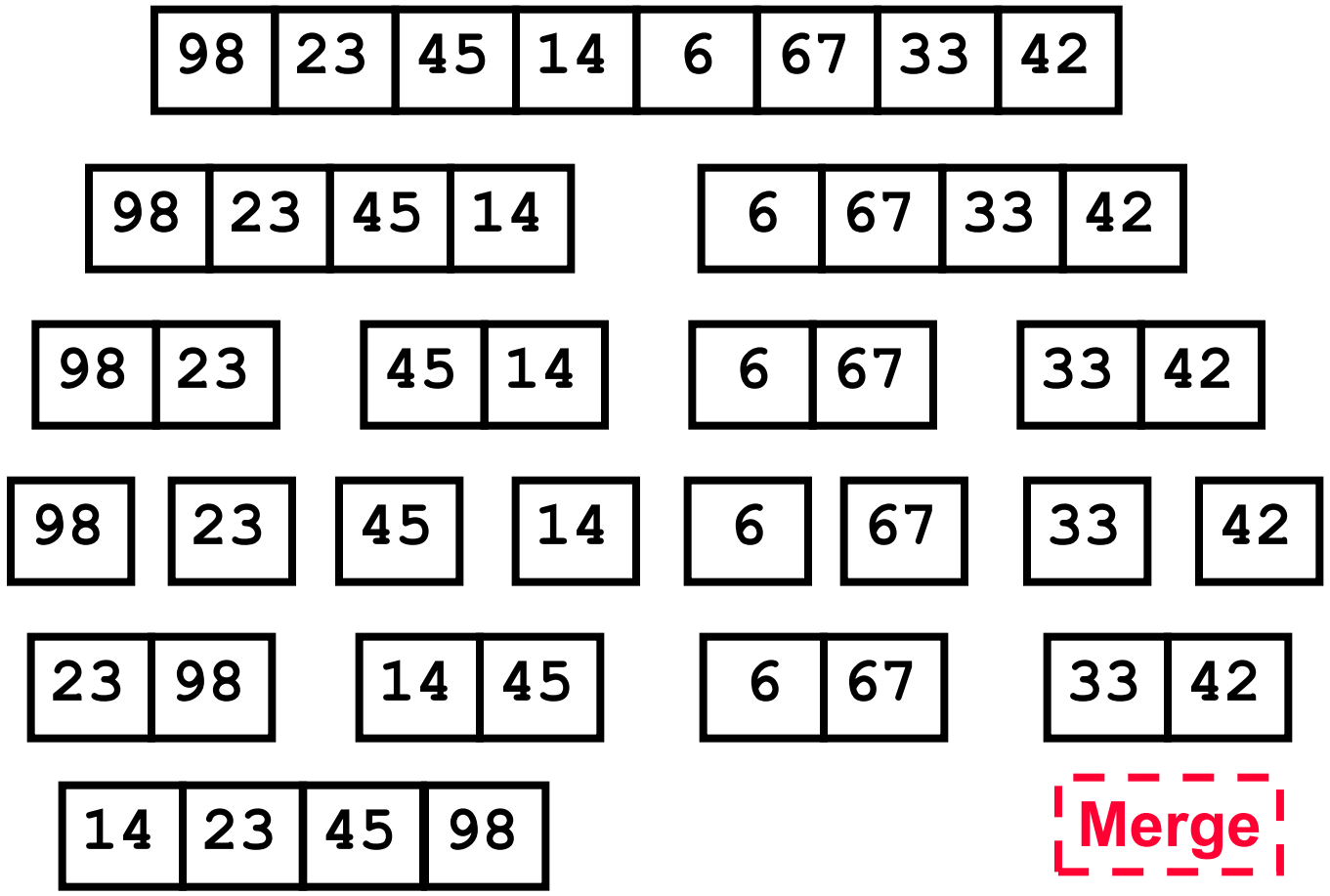
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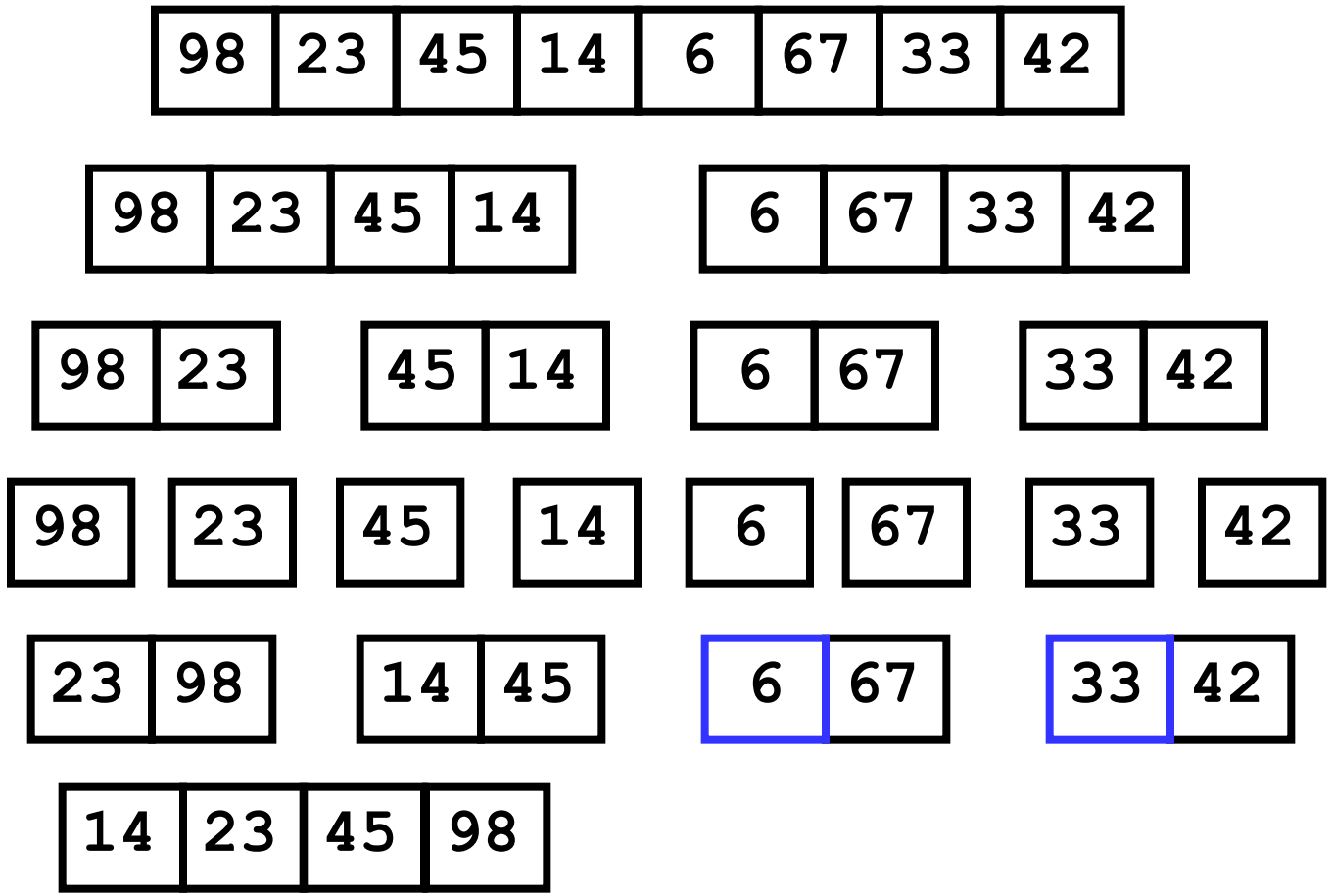
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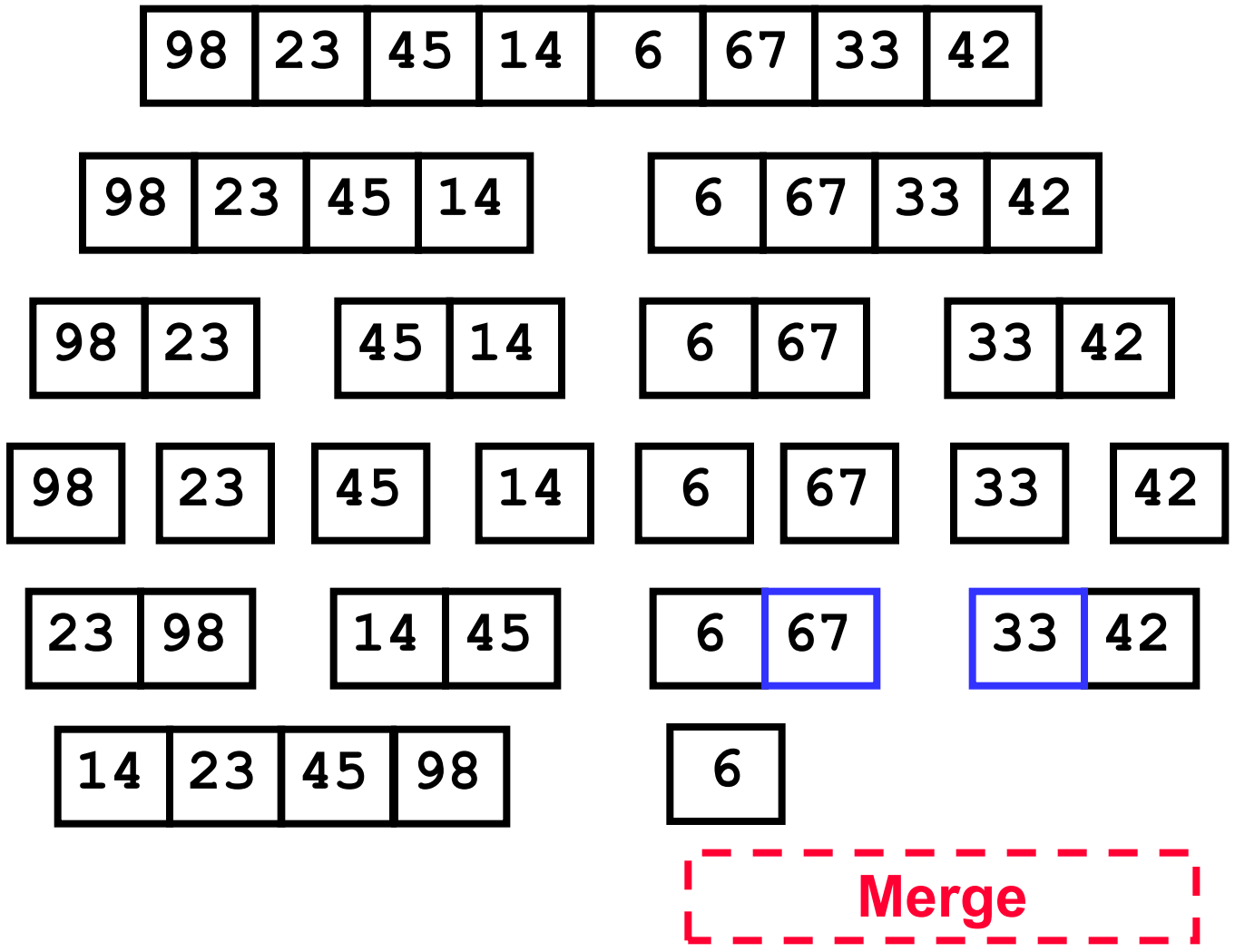
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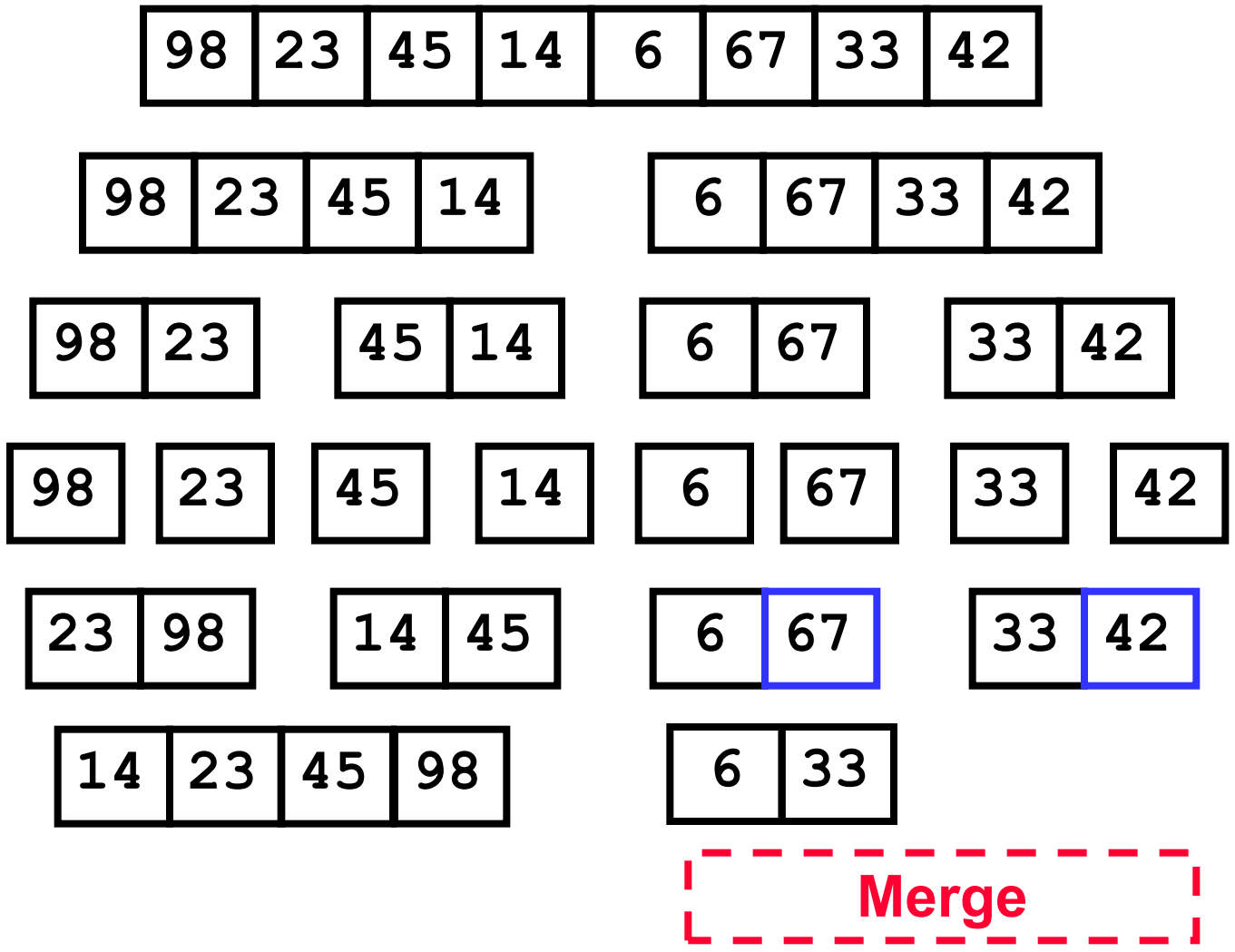
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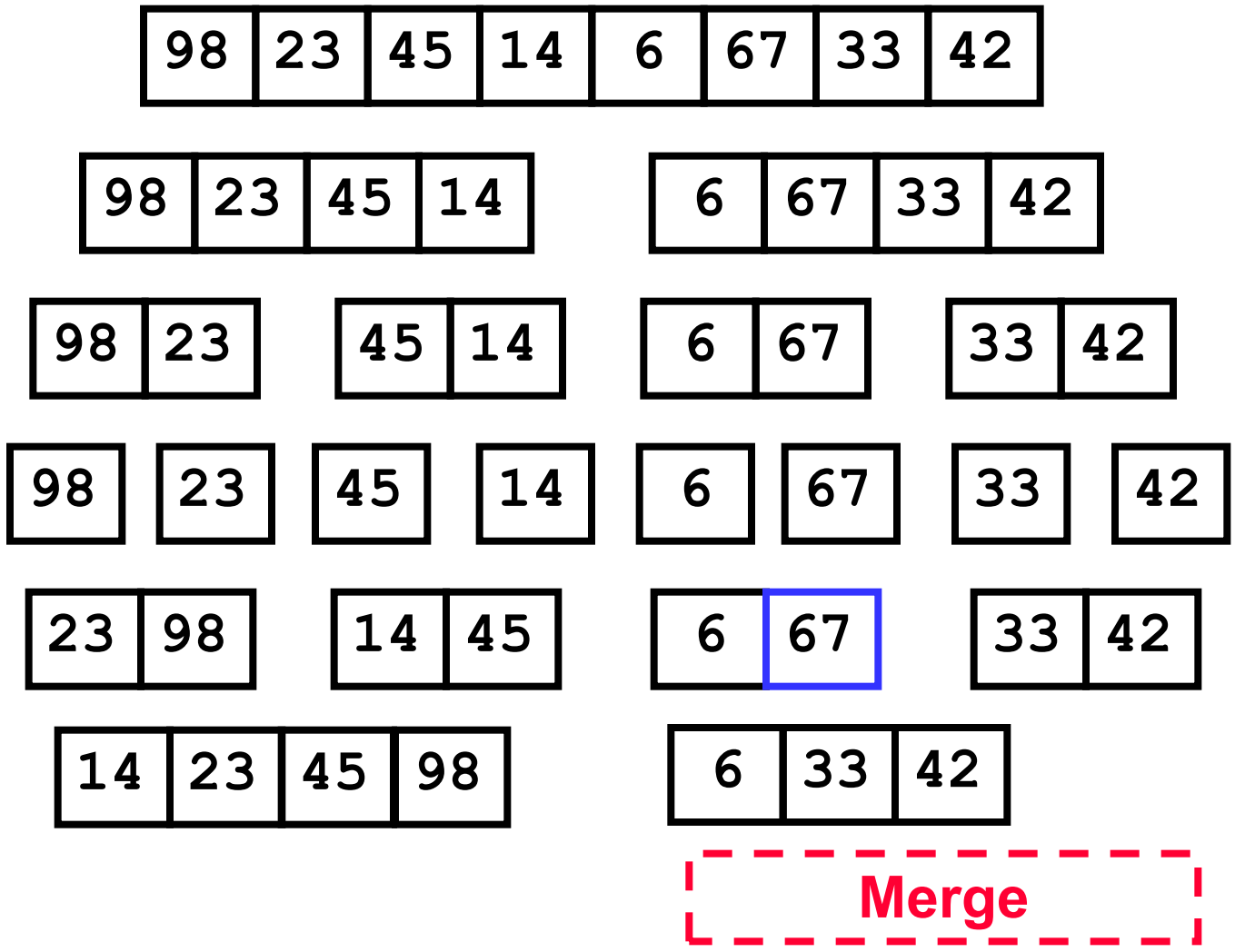
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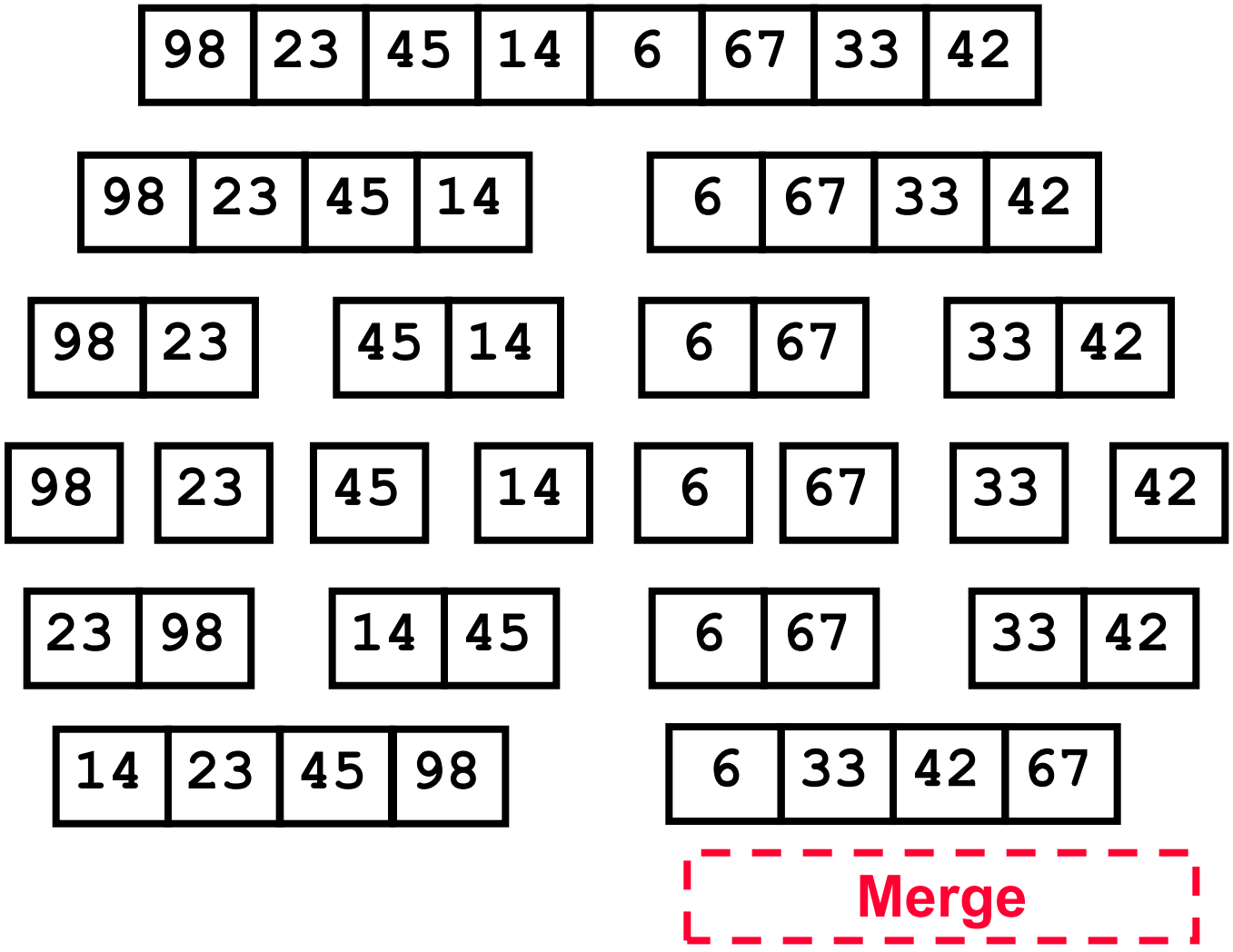
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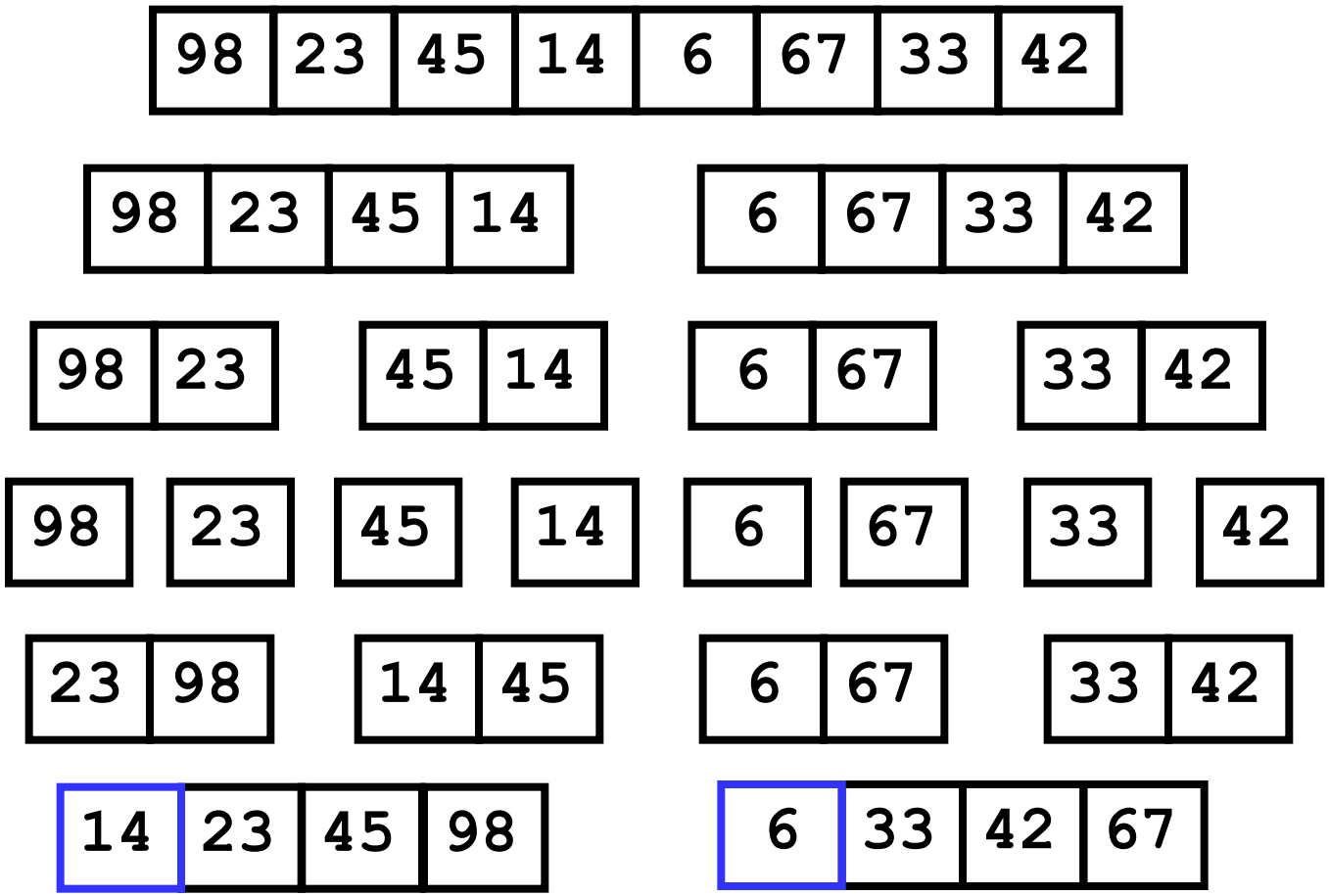
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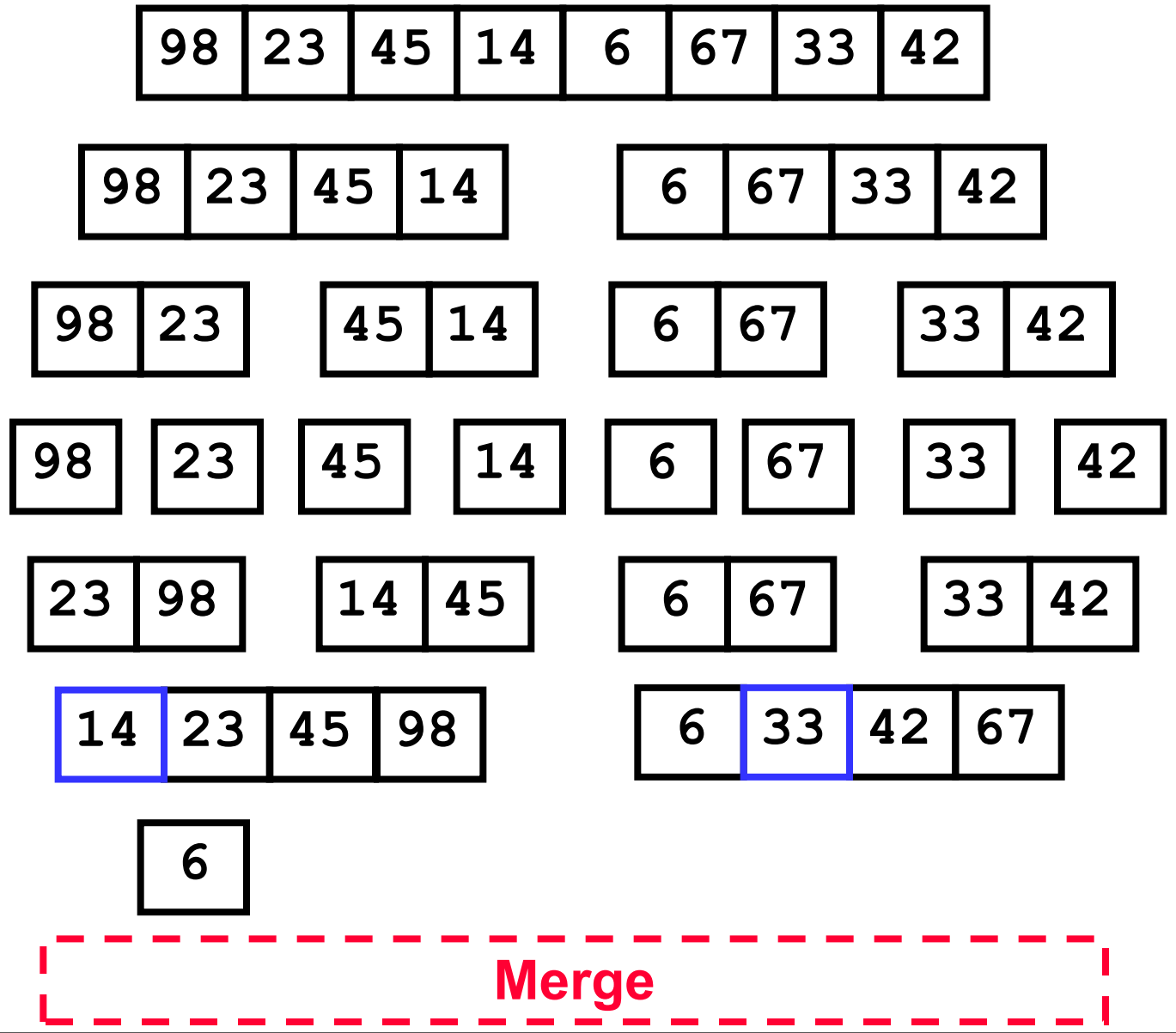
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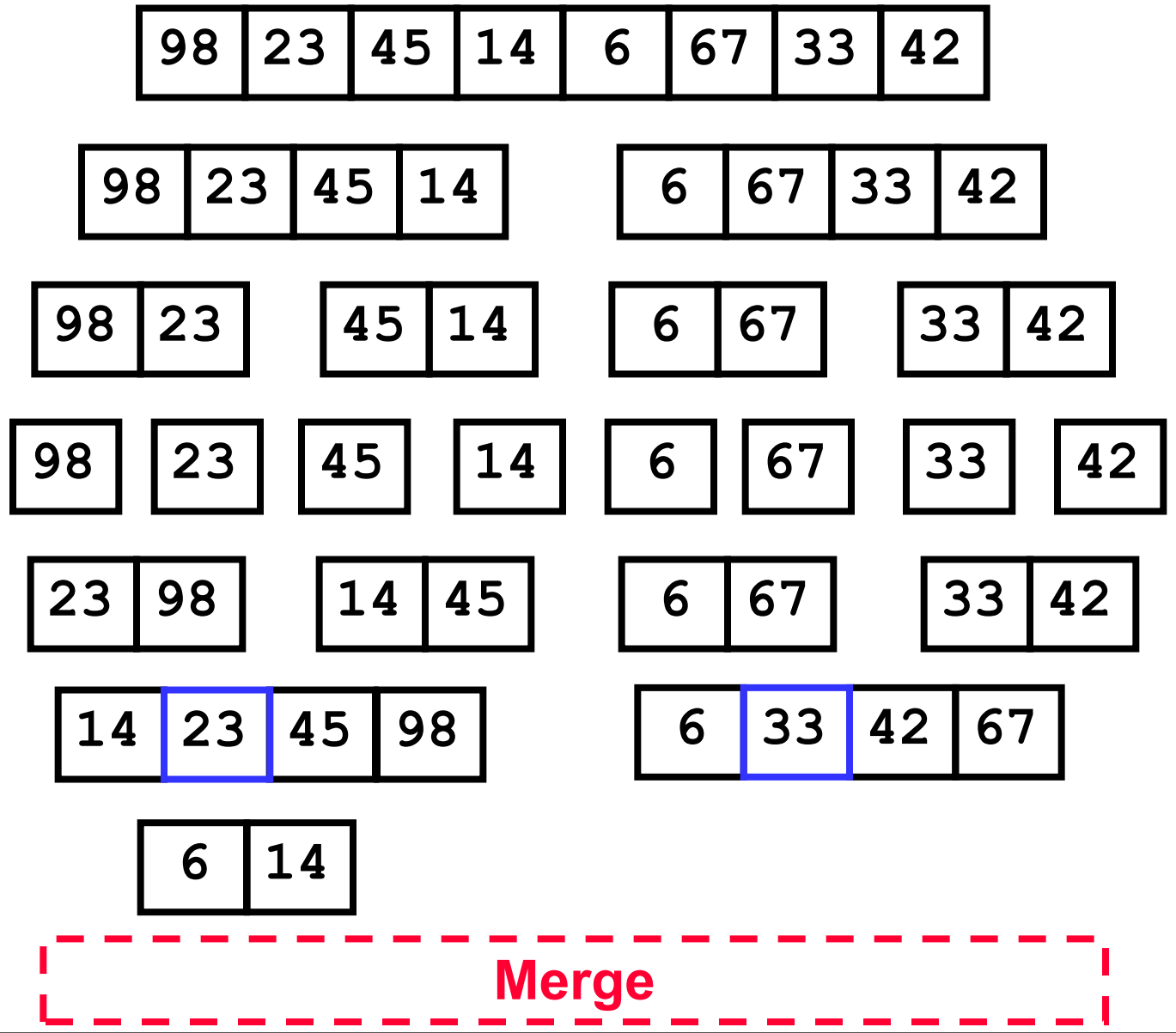
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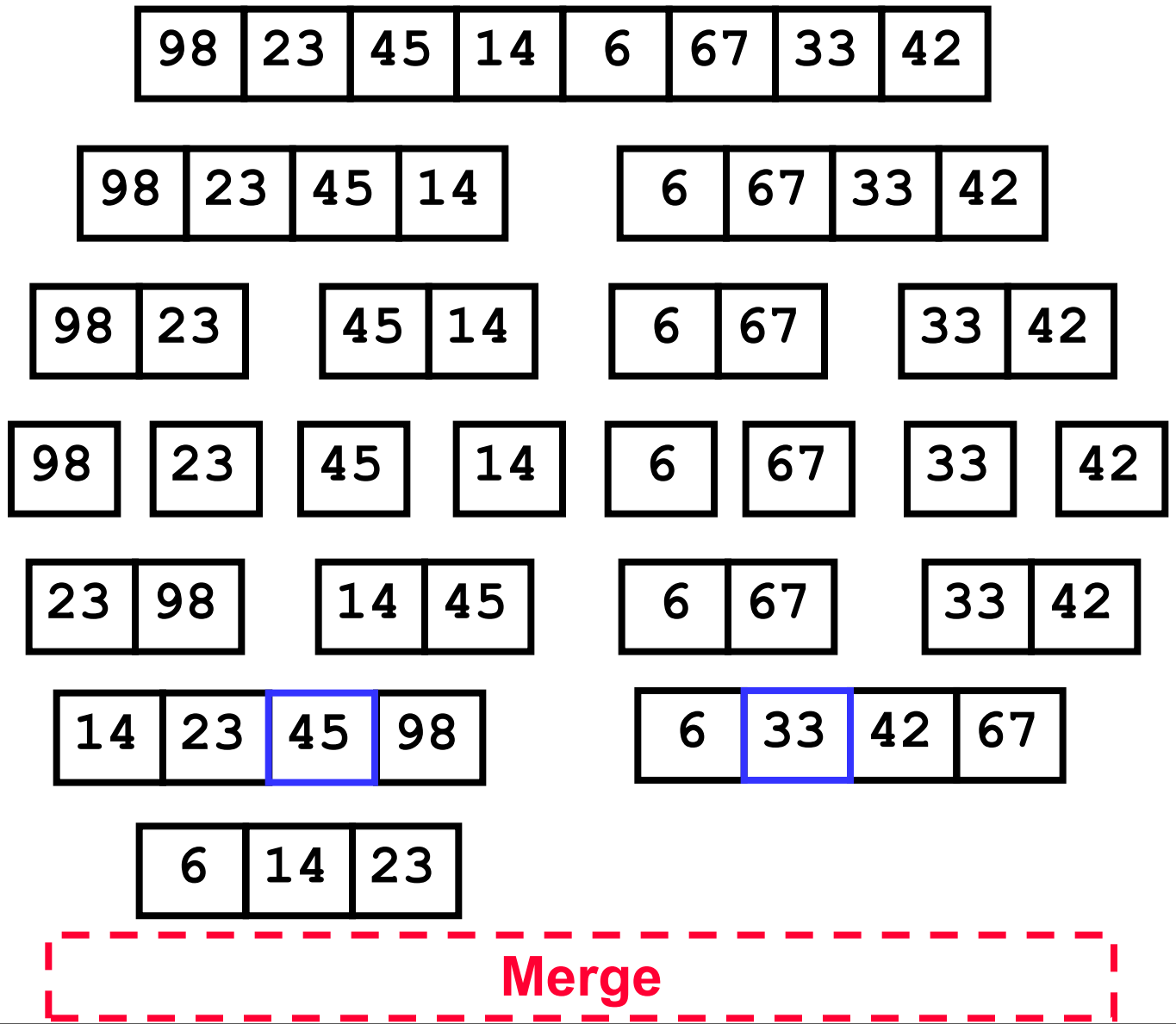
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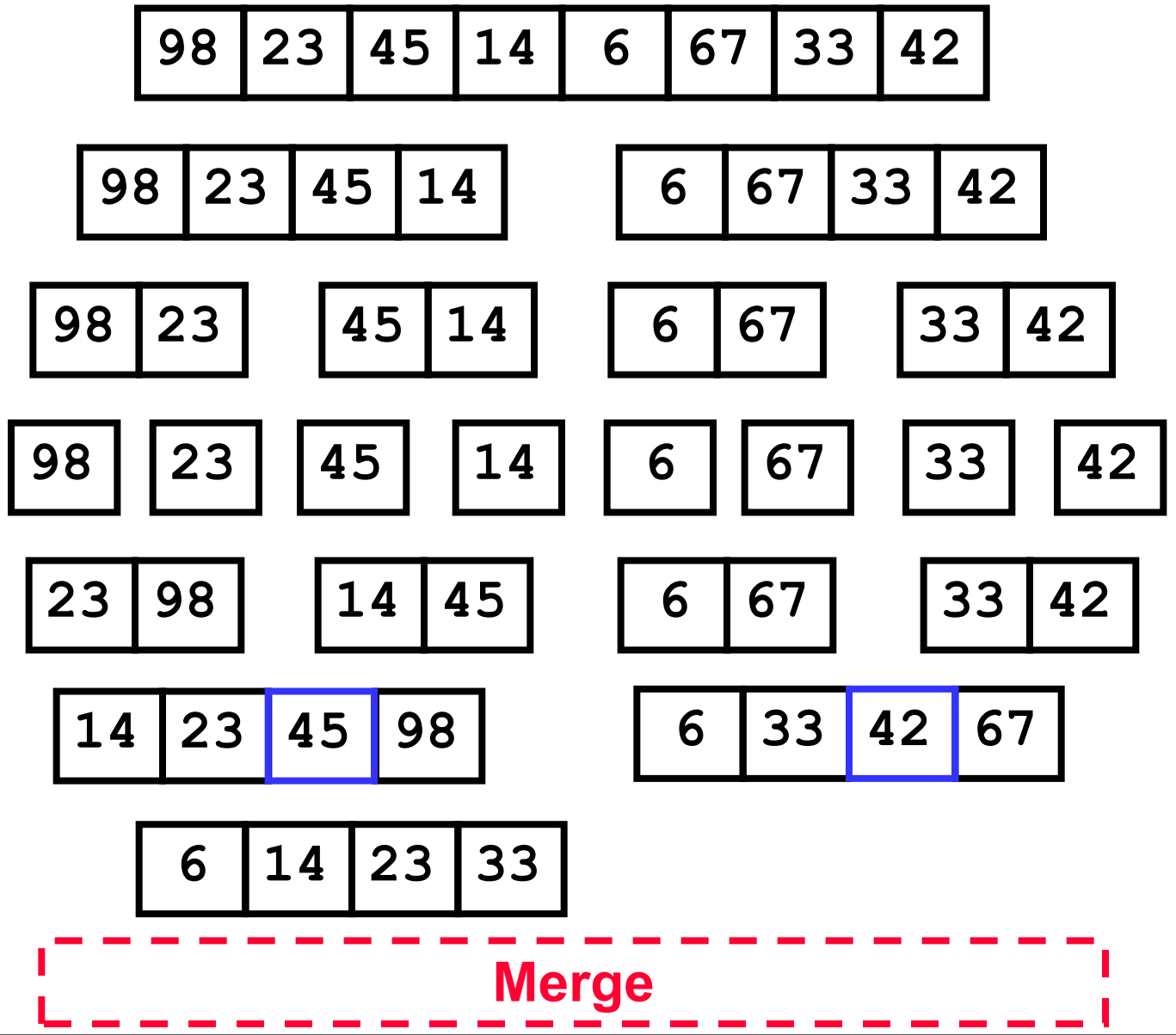
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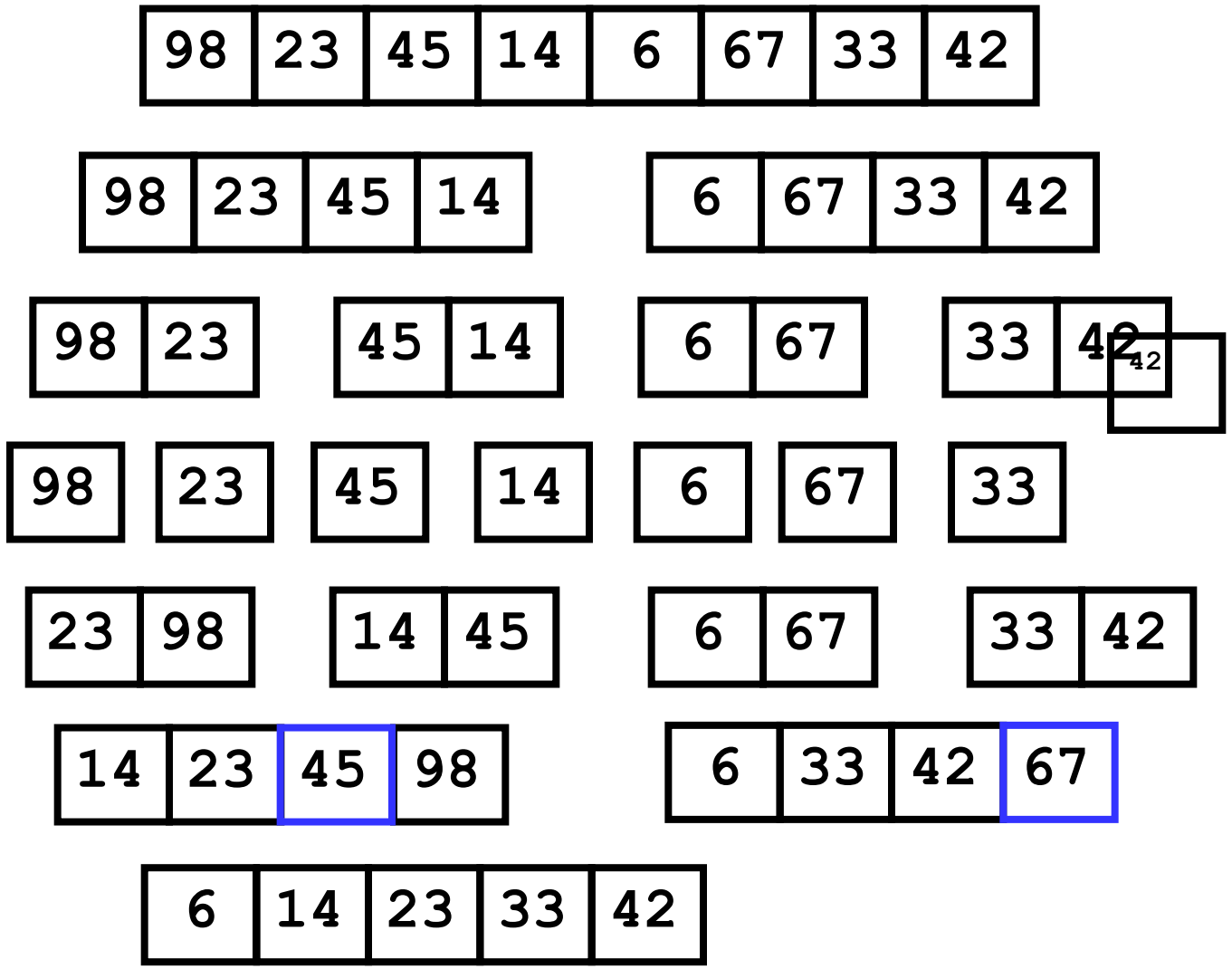
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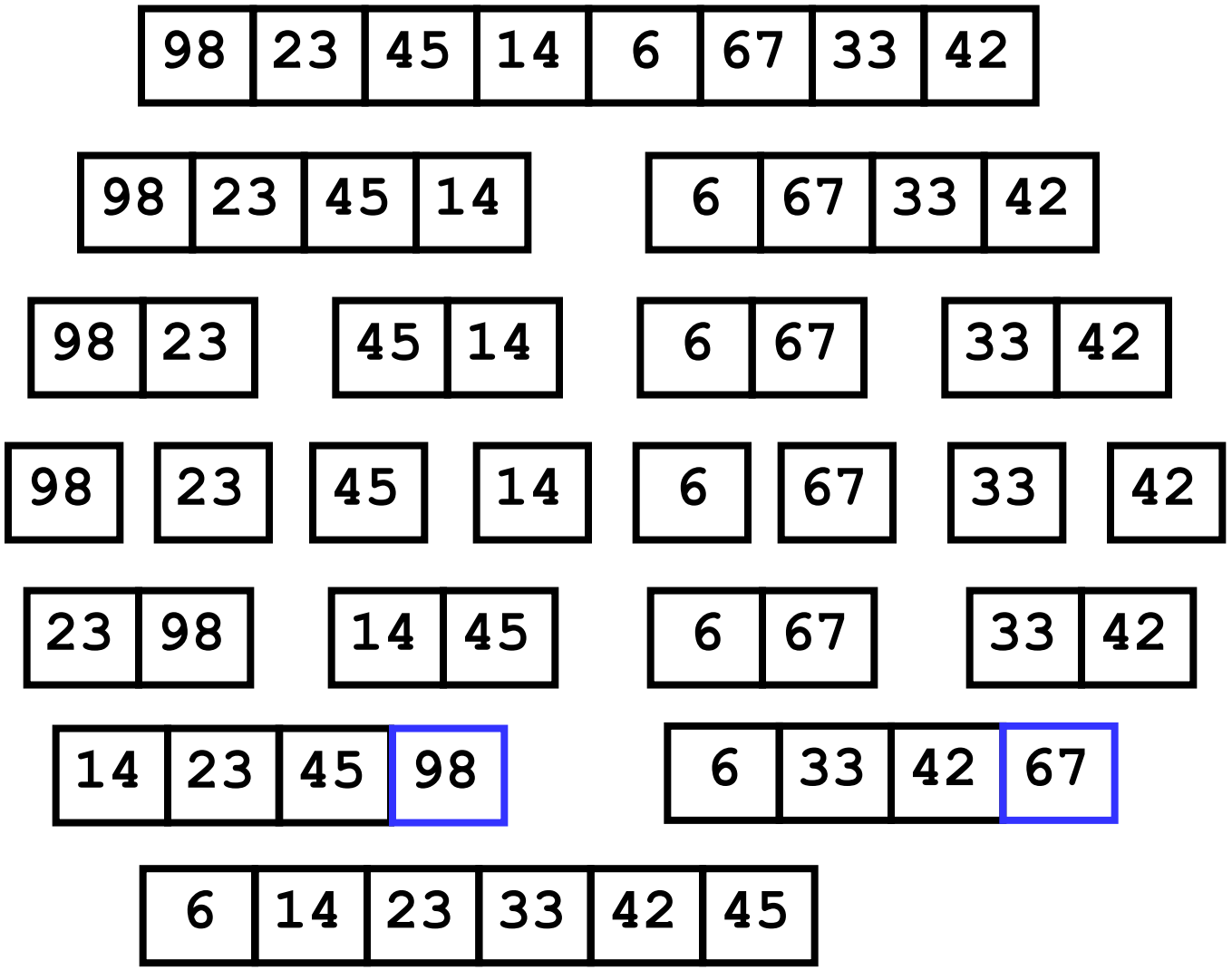
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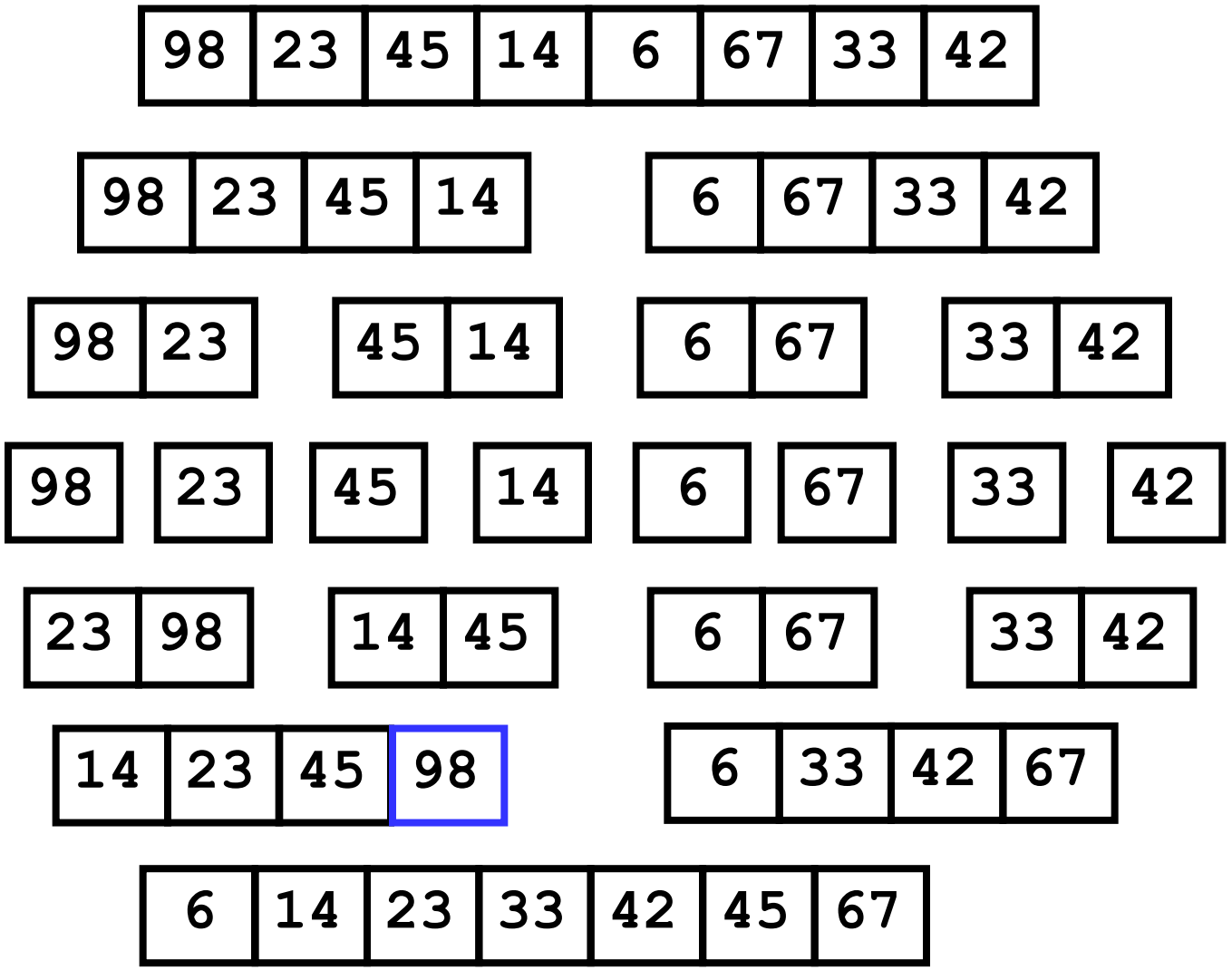
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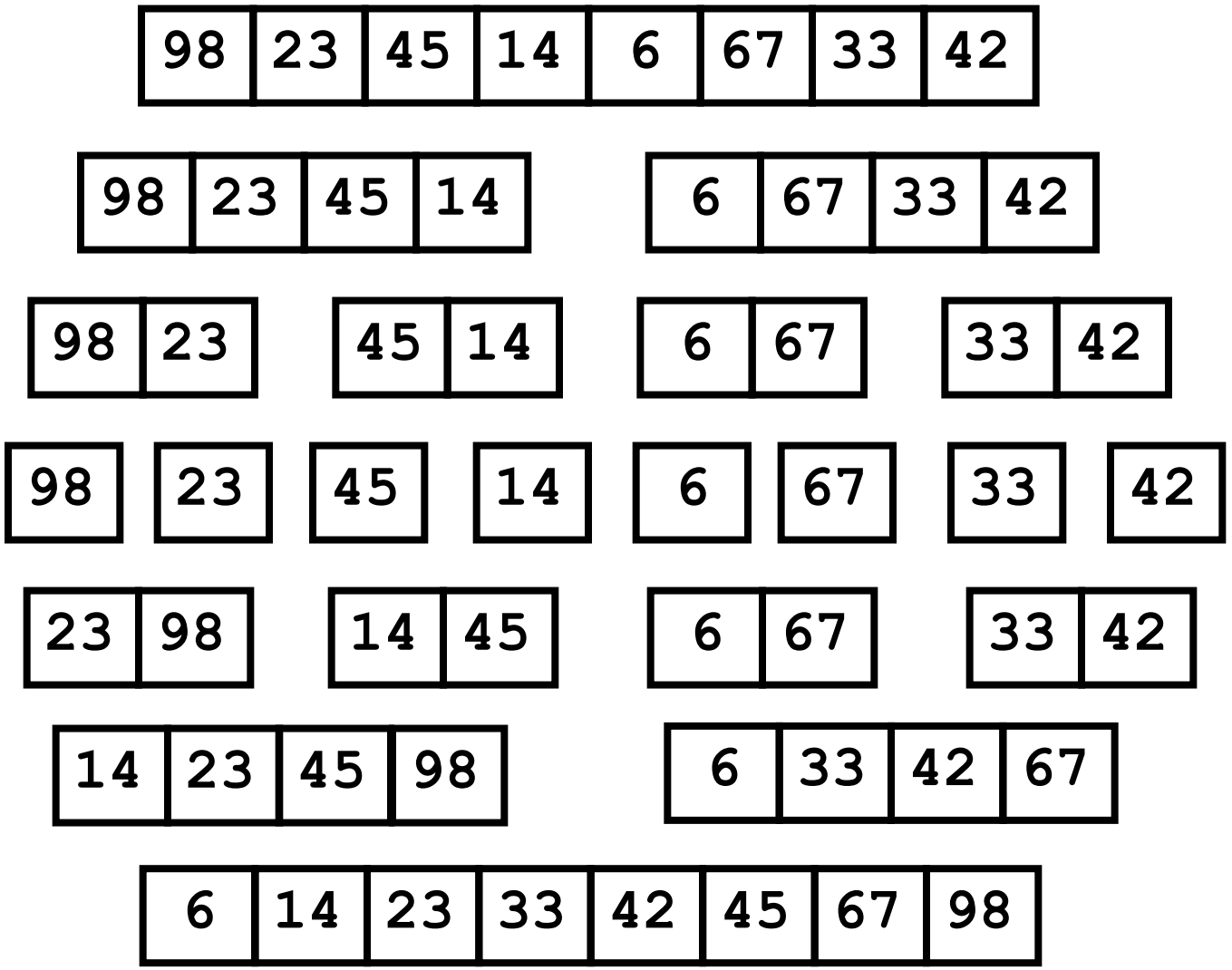
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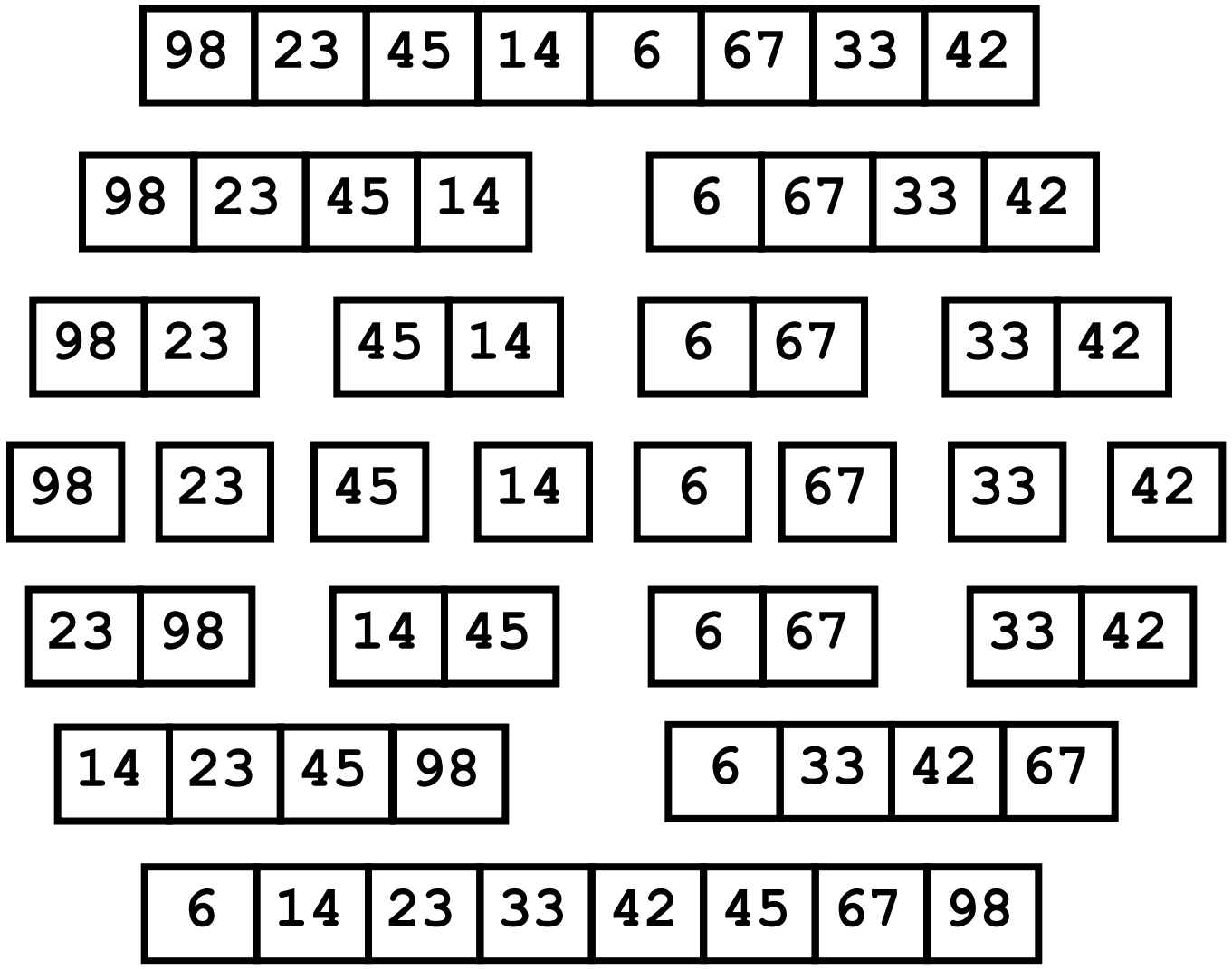
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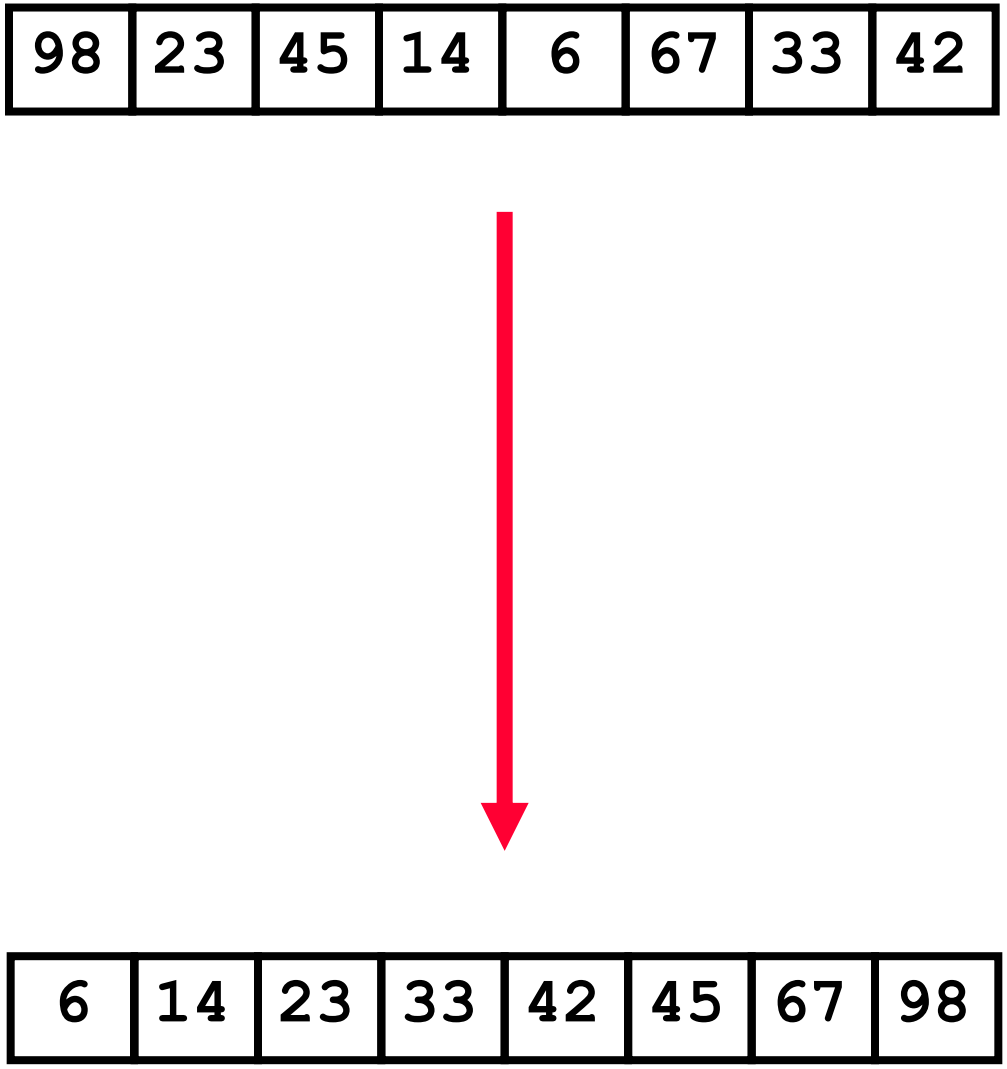

Tugas

- Buatlah flowchart masing-masing algoritma sorting menggunakan flowgorithm atau raptor
- Presentasikan hasil pekerjaan Anda.