Bubble sort

Programovacie techniky | Pavol Marák

OBSAH

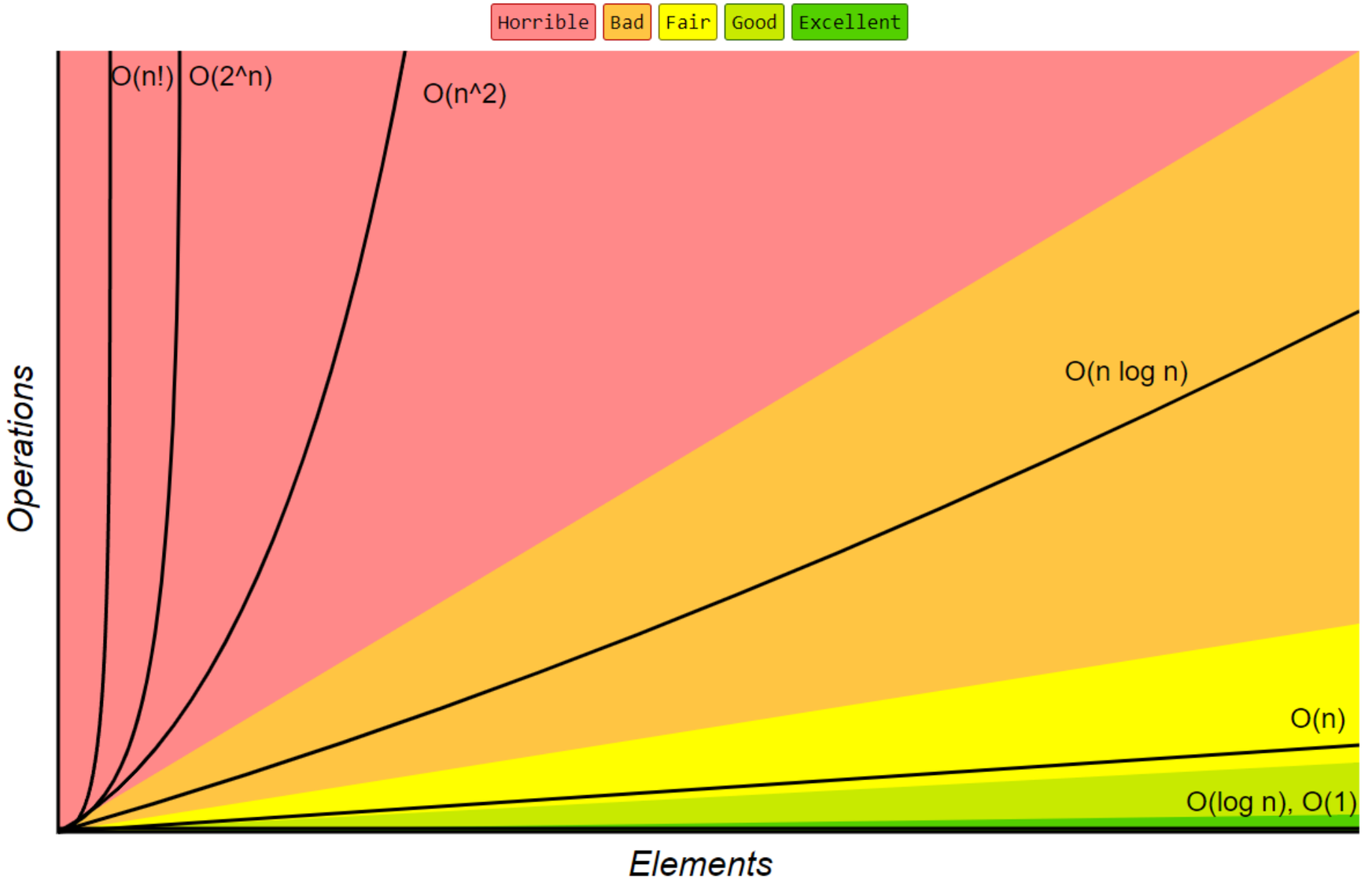
Bubble sort

- Princíp
- Vizualizácia
- Implementácia v C/C++

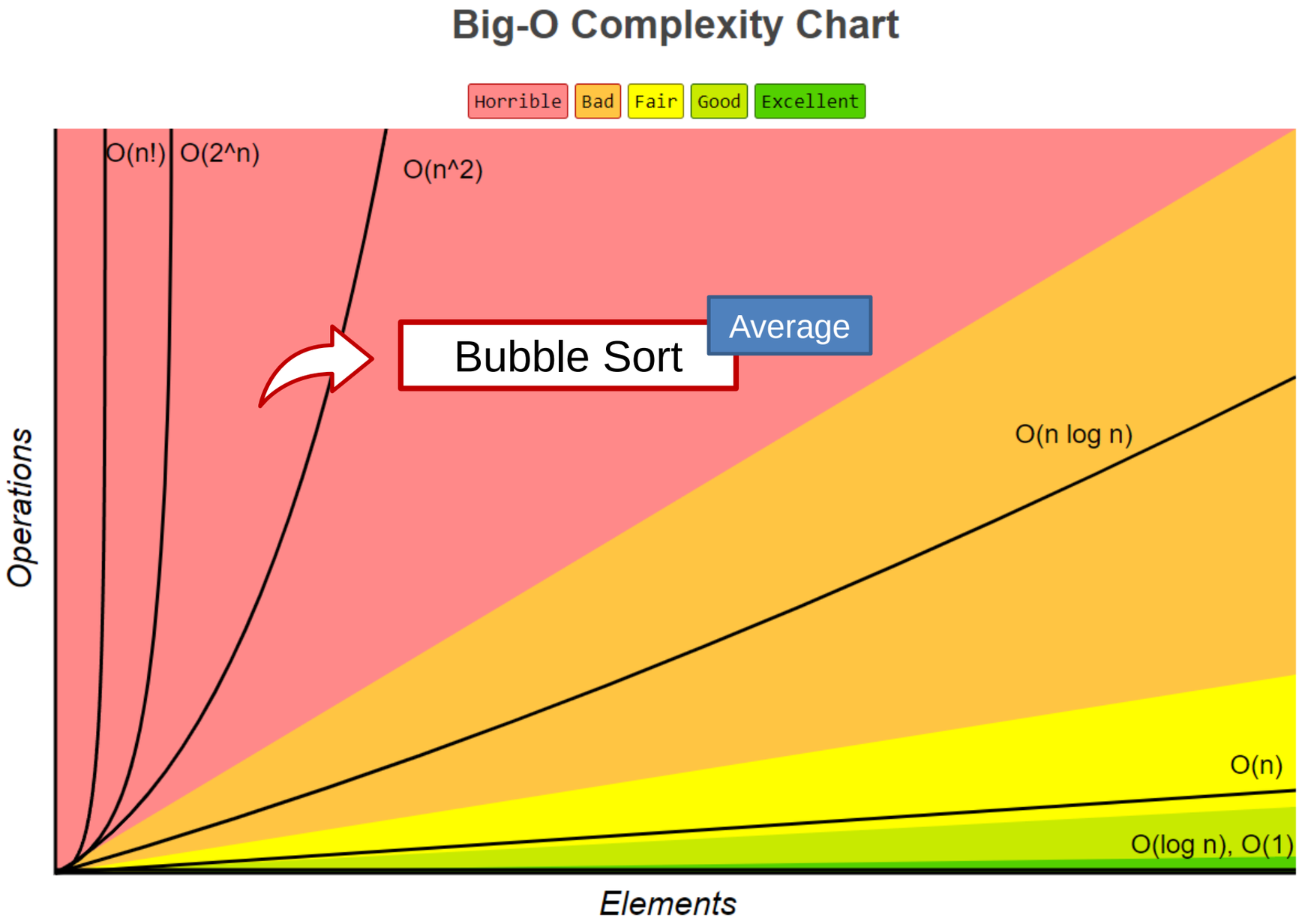
Bubble sort

- **Motivácia:** pedagogický význam a jednoduchosť.
- Pomalý algoritmus, nepraktický, zložitosť $O(n^2)$.
- Stabilný algoritmus.

Big-O Complexity Chart



Zdroj: https://www.bigocheatsheet.com/



Zdroj: https://www.bigocheatsheet.com/

Array Sorting Algorithms

Algorithm	Time Complexity			Space Complexity
	Best	Average	Worst	Worst
Quicksort	Ω(n log(n))	Θ(n log(n))	O(n^2)	O(log(n))
Mergesort	Ω(n log(n))	Θ(n log(n))	O(n log(n))	O(n)
Timsort	Ω(n)	Θ(n log(n))	O(n log(n))	O(n)
Heapsort	Ω(n log(n))	Θ(n log(n))	O(n log(n))	O(1)
Bubble Sort	Ω(n)	Θ(n^2)	O(n^2)	O(1)
Insertion Sort	Ω(n)	Θ(n^2)	O(n^2)	O(1)
Selection Sort	Ω(n^2)	Θ(n^2)	O(n^2)	O(1)
Tree Sort	Ω(n log(n))	Θ(n log(n))	O(n^2)	O(n)
Shell Sort	Ω(n log(n))	Θ(n(log(n))^2)	O(n(log(n))^2)	O(1)
Bucket Sort	Ω(n+k)	Θ(n+k)	O(n^2)	O(n)
Radix Sort	Ω(nk)	Θ(nk)	O(nk)	O(n+k)
Counting Sort	Ω(n+k)	Θ(n+k)	O(n+k)	O(k)
Cubesort	Ω(n)	Θ(n log(n))	O(n log(n))	O(n)

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Bubble sort

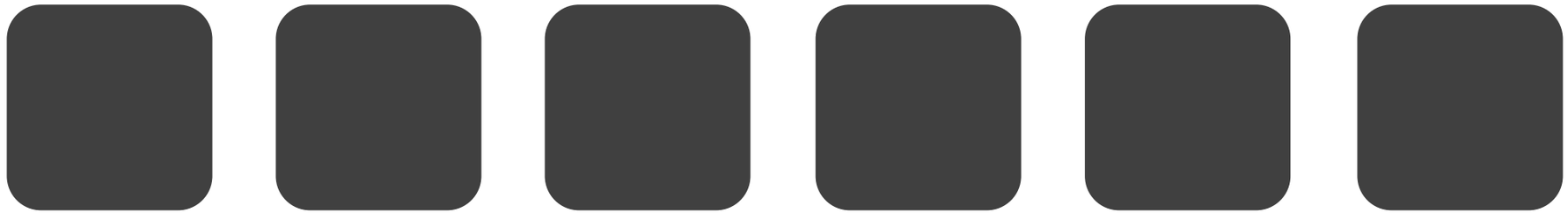
Princíp

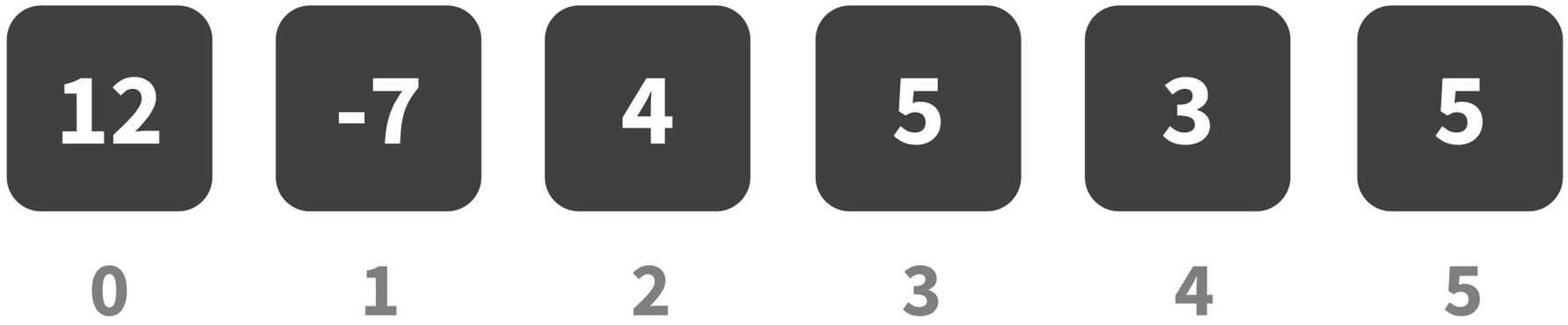
- Opakovaný prechod poľom.
- V každom prechode sa vymieňajú (z angl. swap) prvky, ktoré sú v nesprávnom poradí.
- Po každom prechode sa usporiada jeden prvok.

Bubble sort

Vizualizácia

Pole

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Úloha: zotriediť pole vzostupne

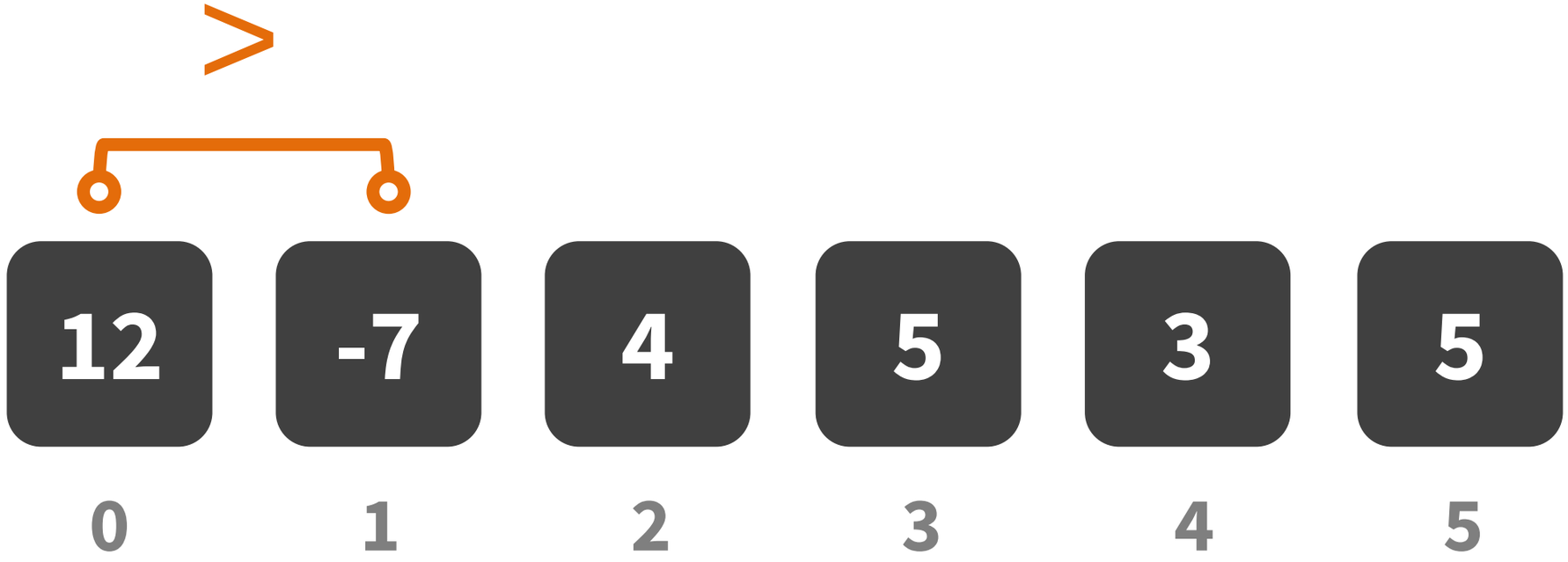
1. prechod poľom

1. prechod

Prechádzame poľom zľava doprava a porovnávame susediace prvky

... ak platí, vykoná sa swap

1. prechod



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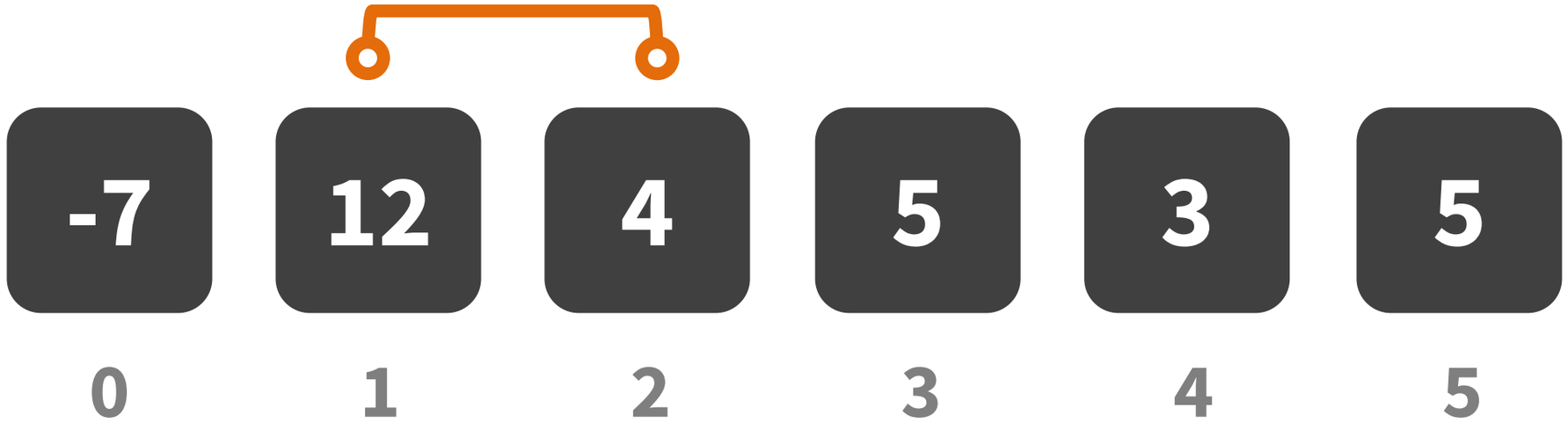

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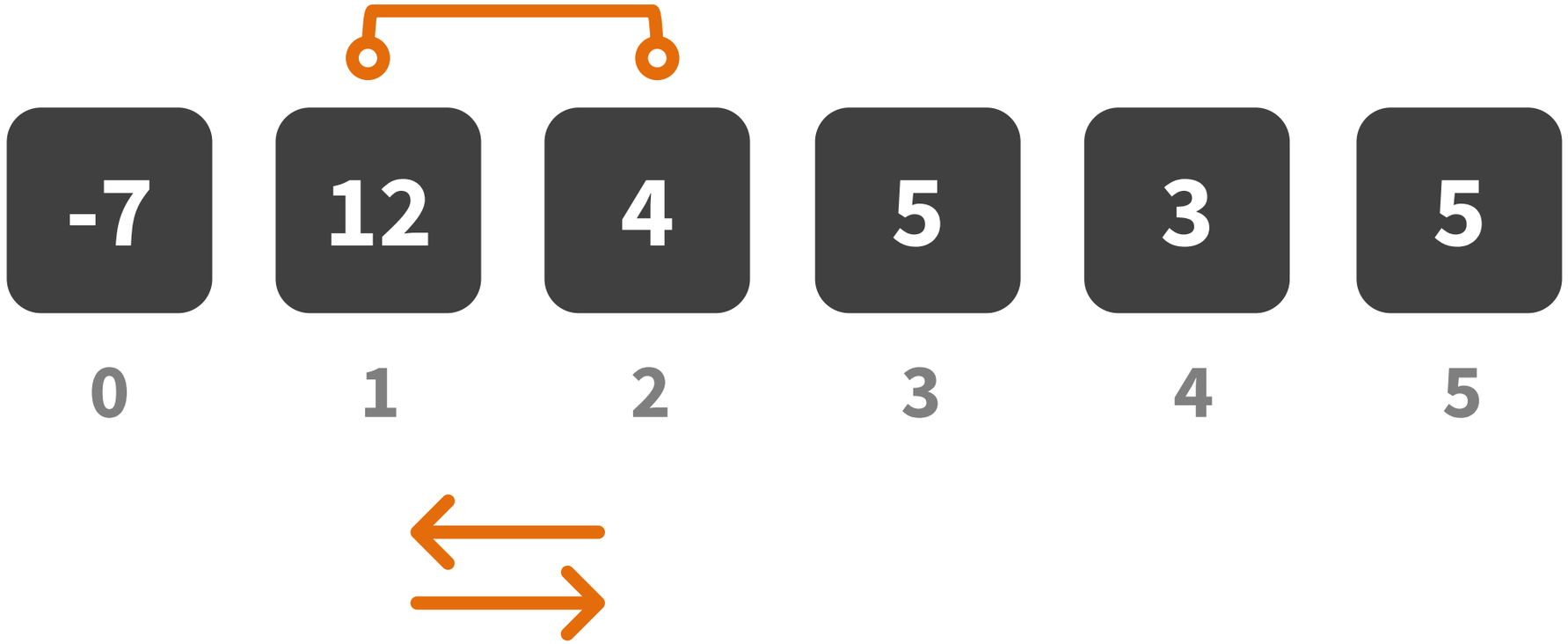

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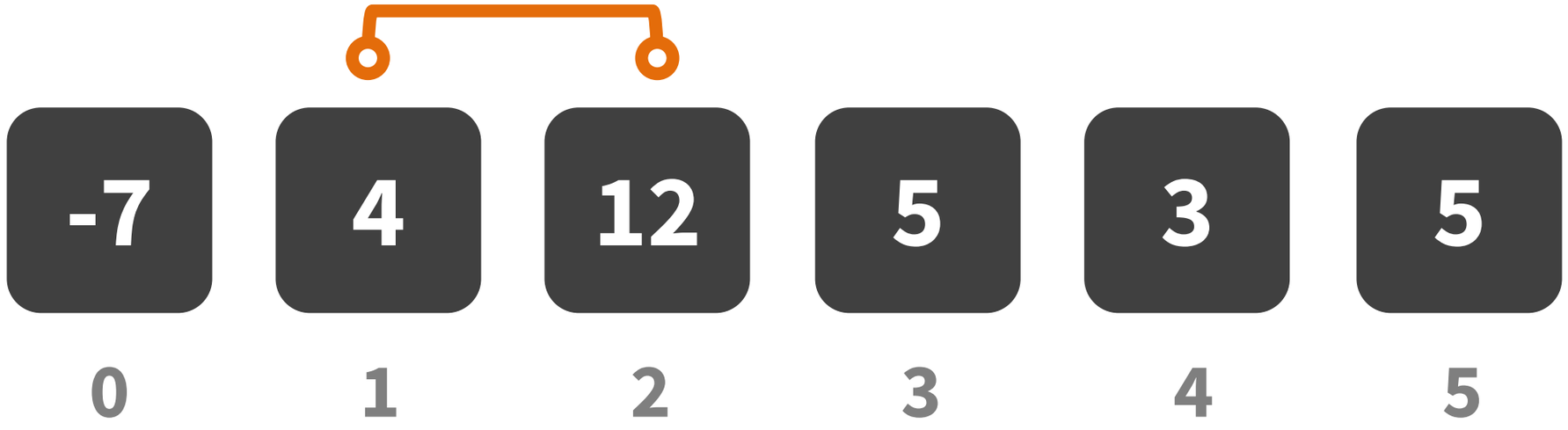

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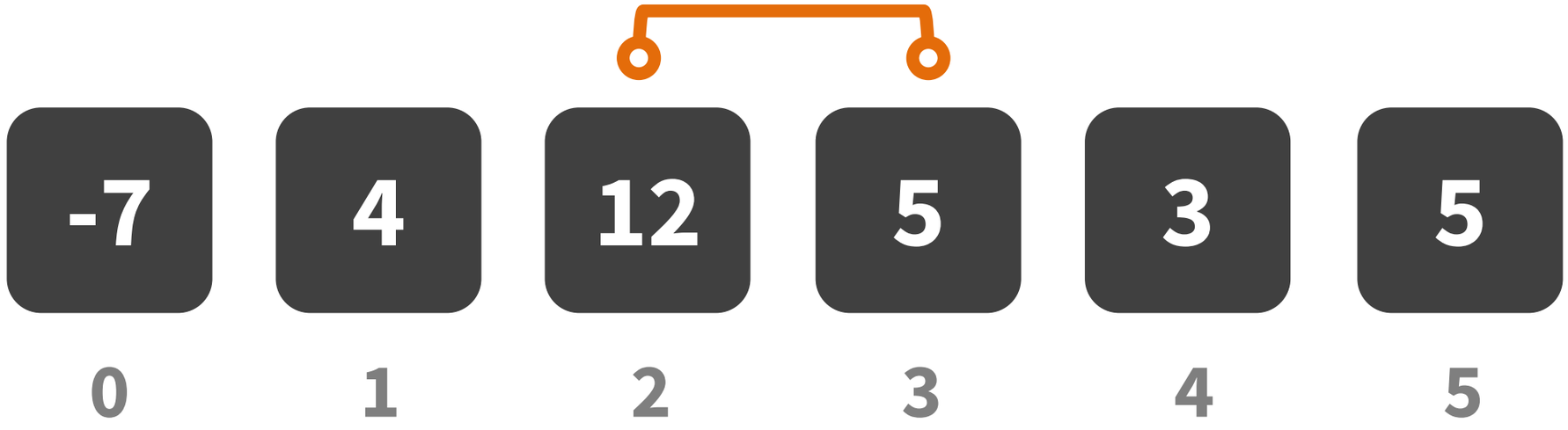

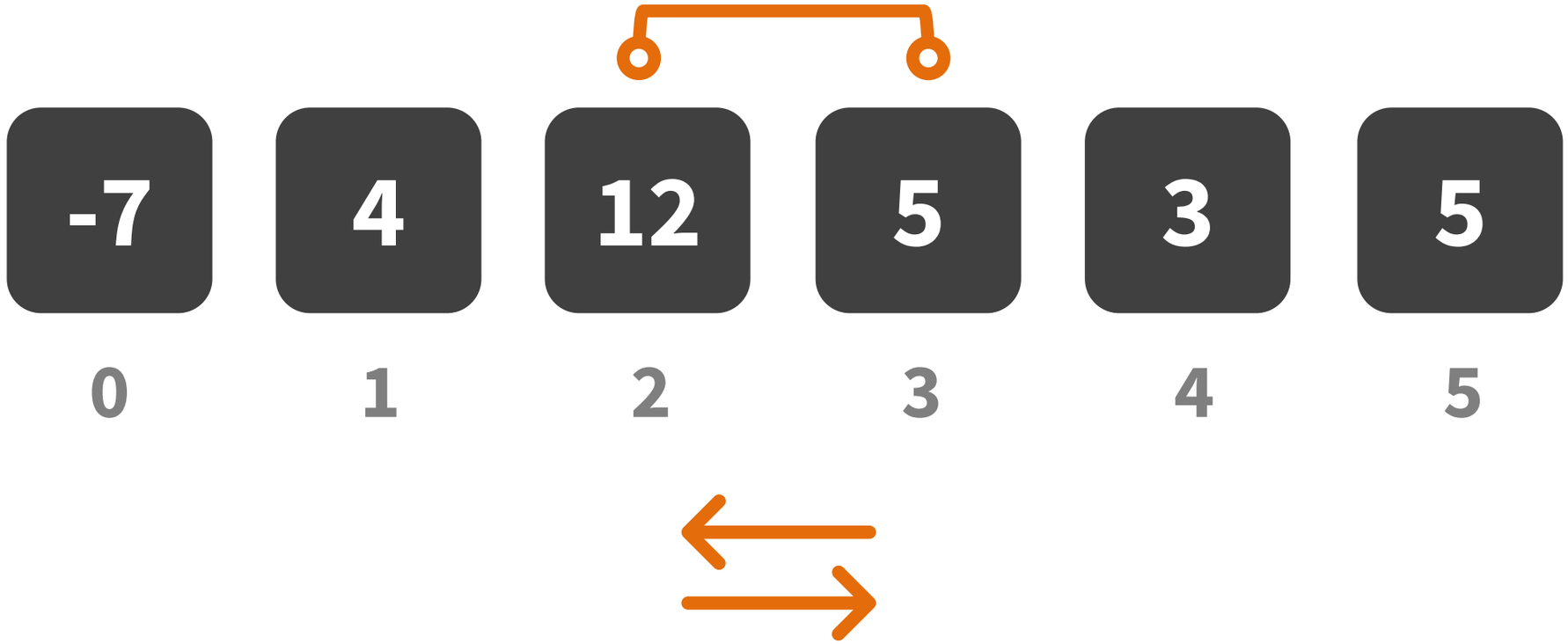
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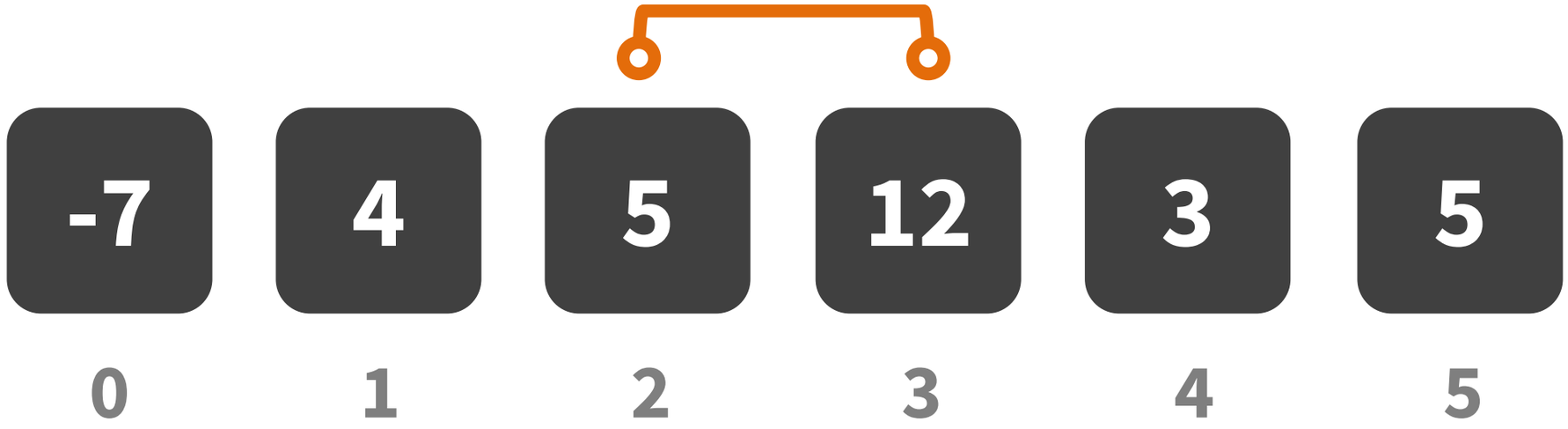

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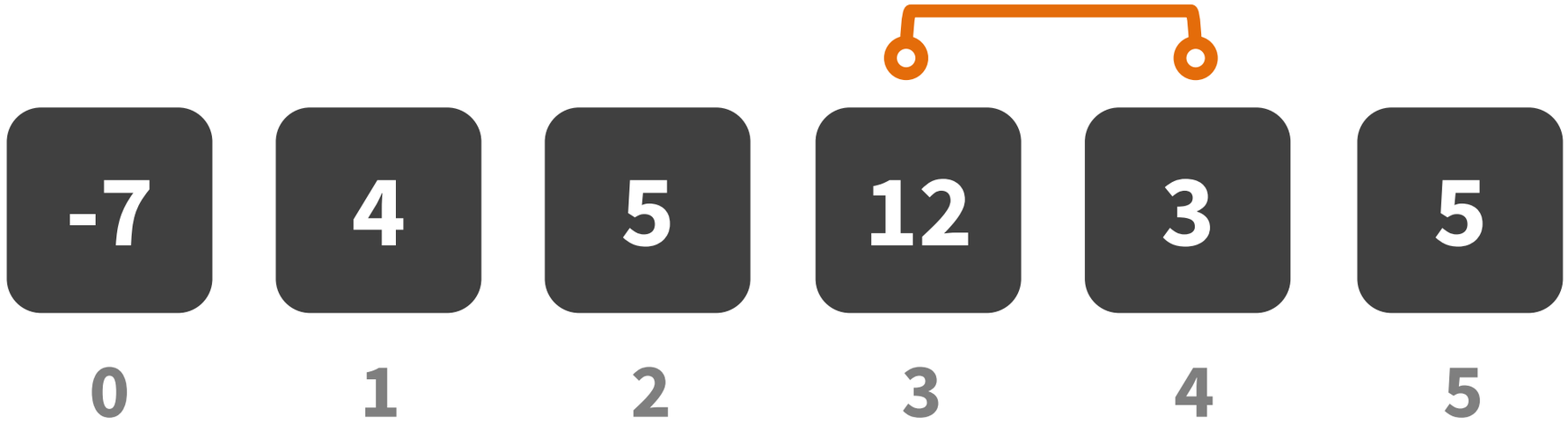

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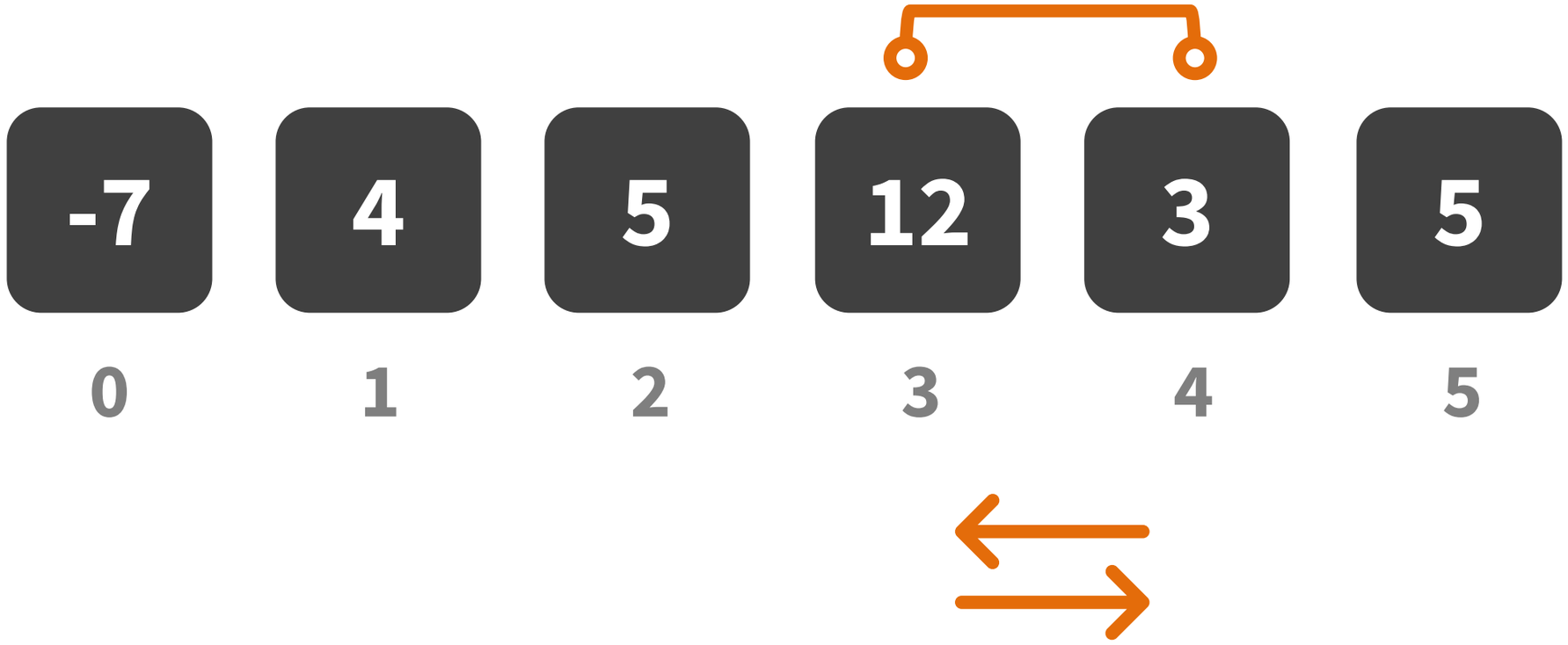

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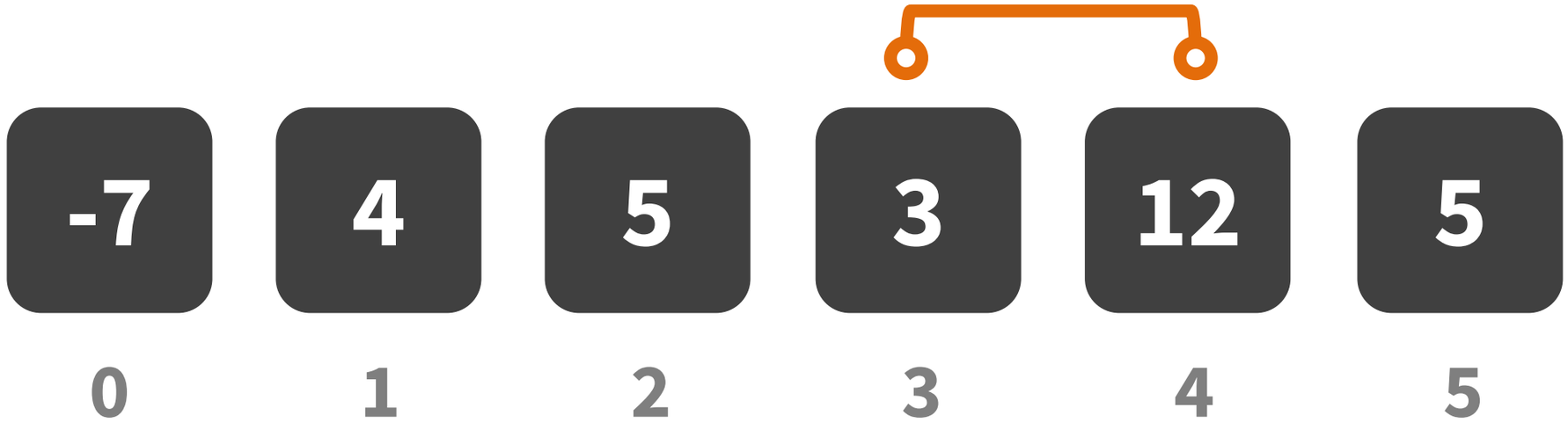

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1. prechod

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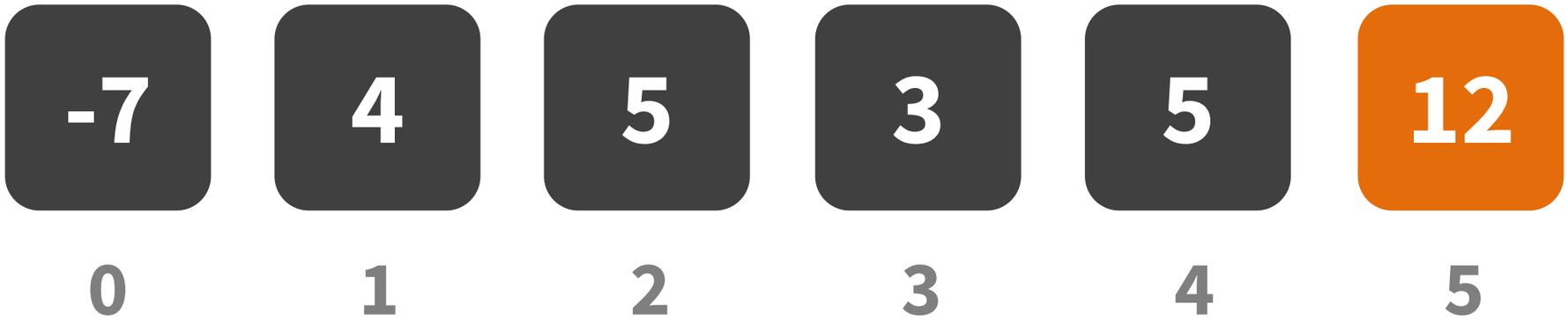
2. prechod poľom



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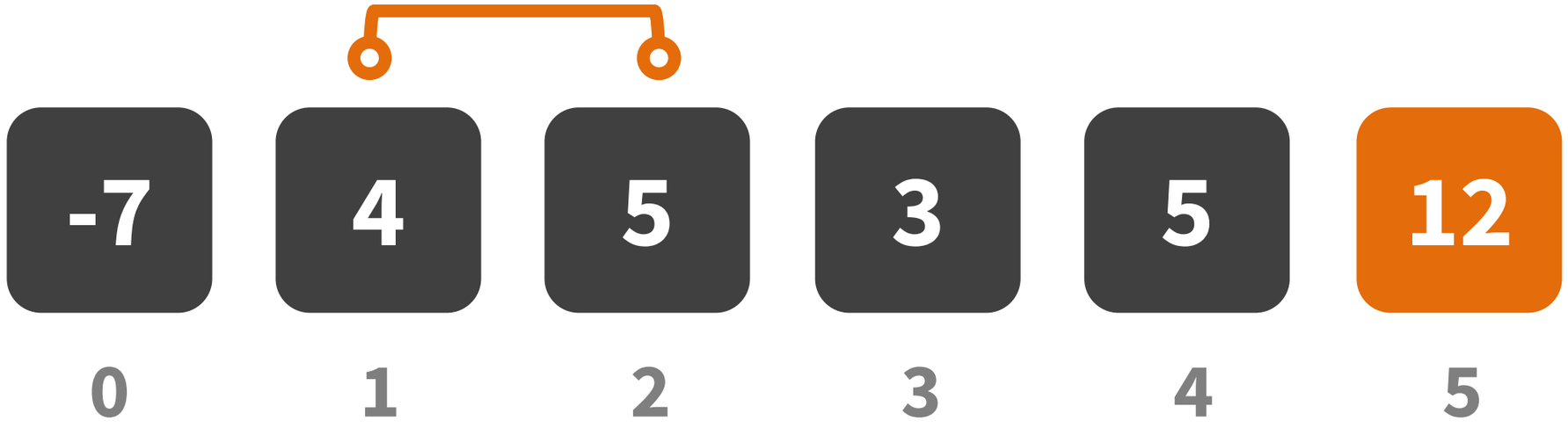

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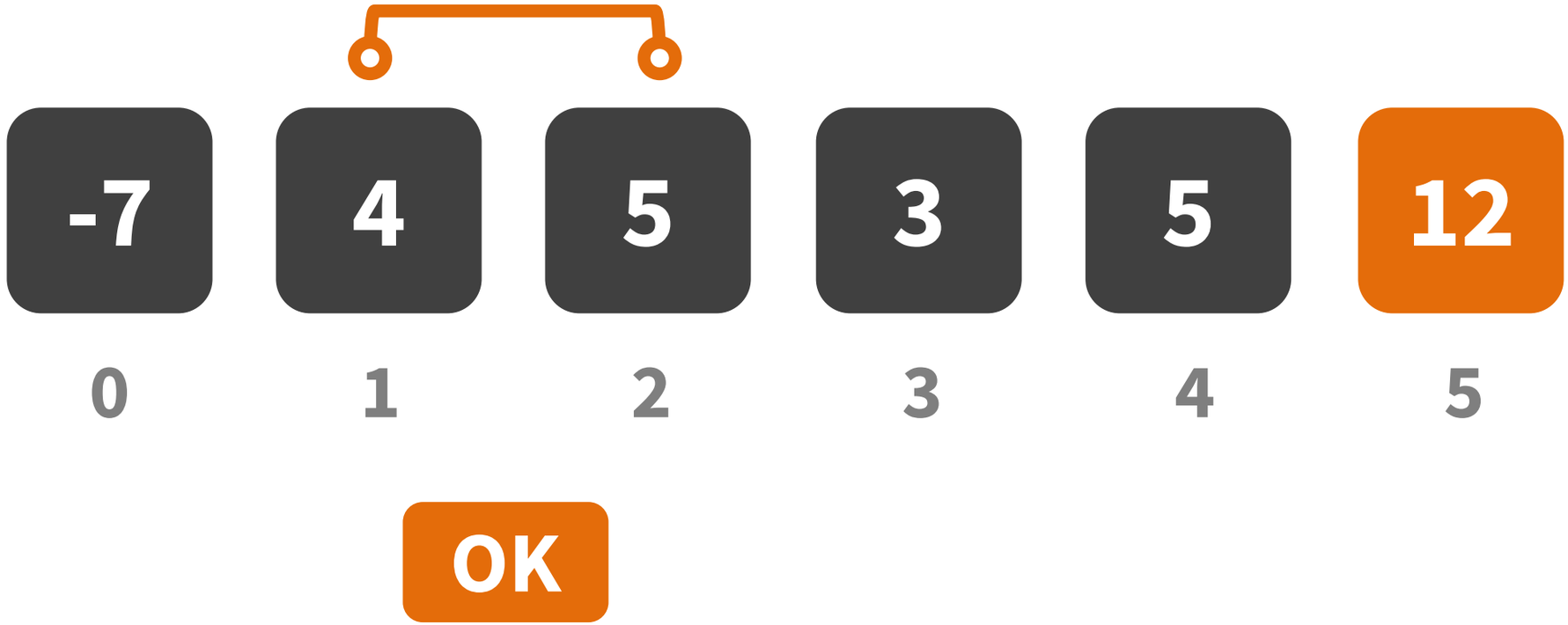

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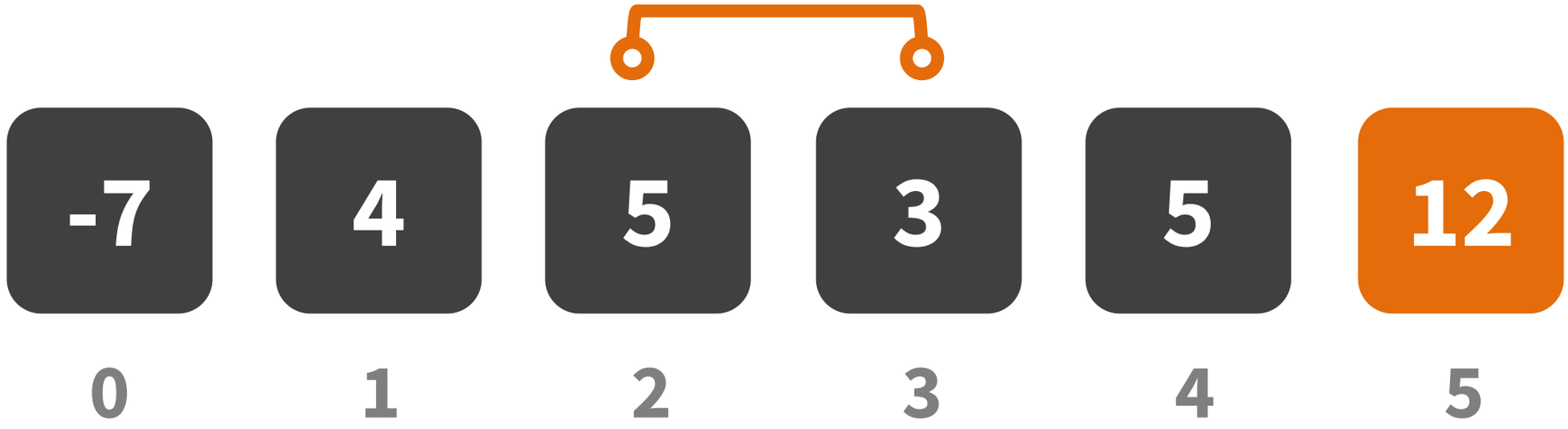

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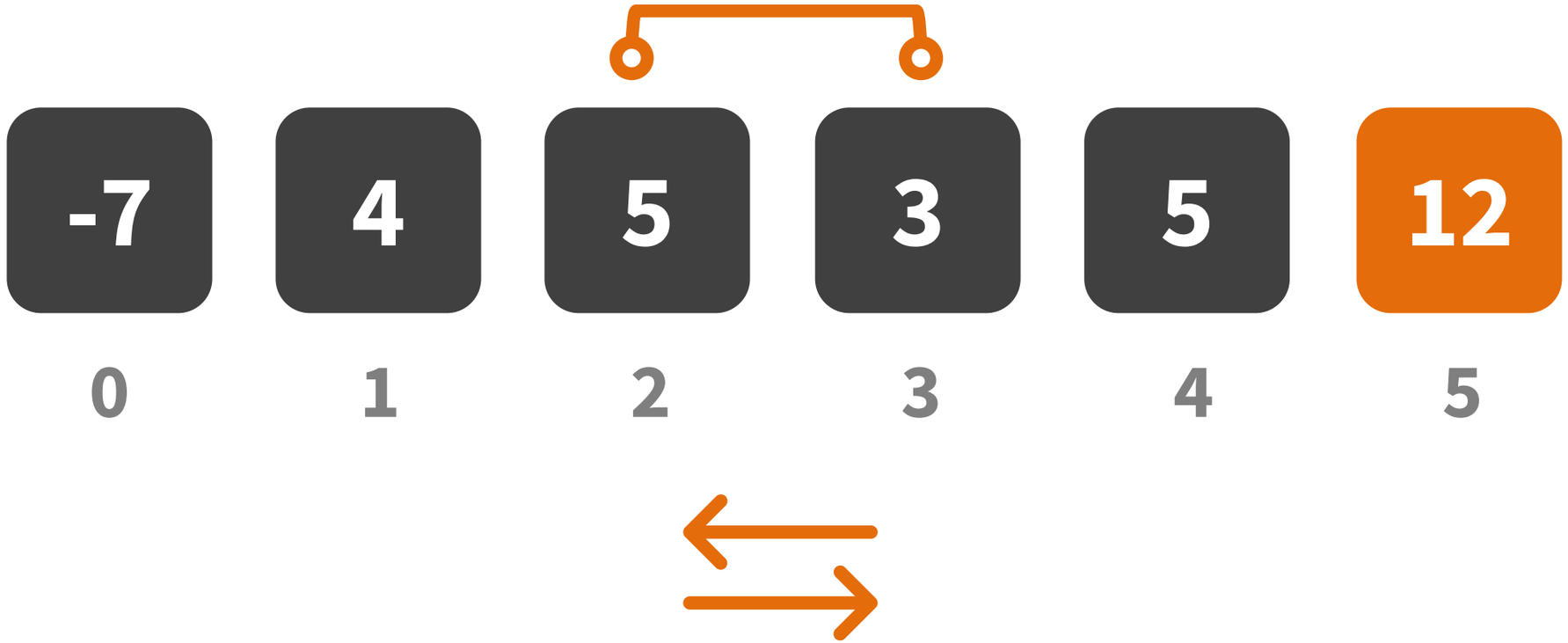

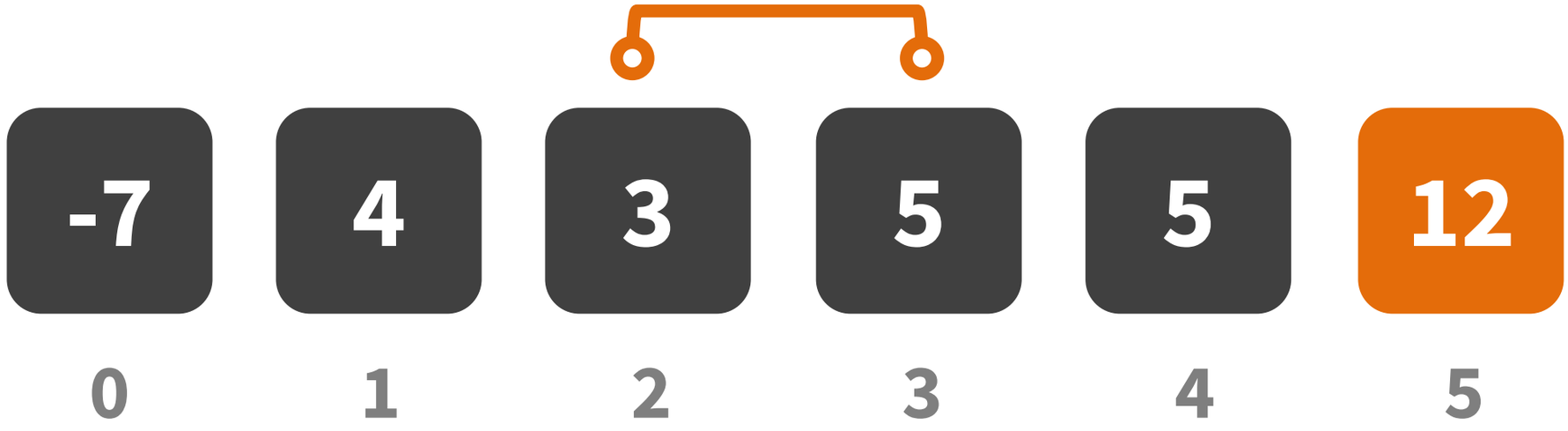
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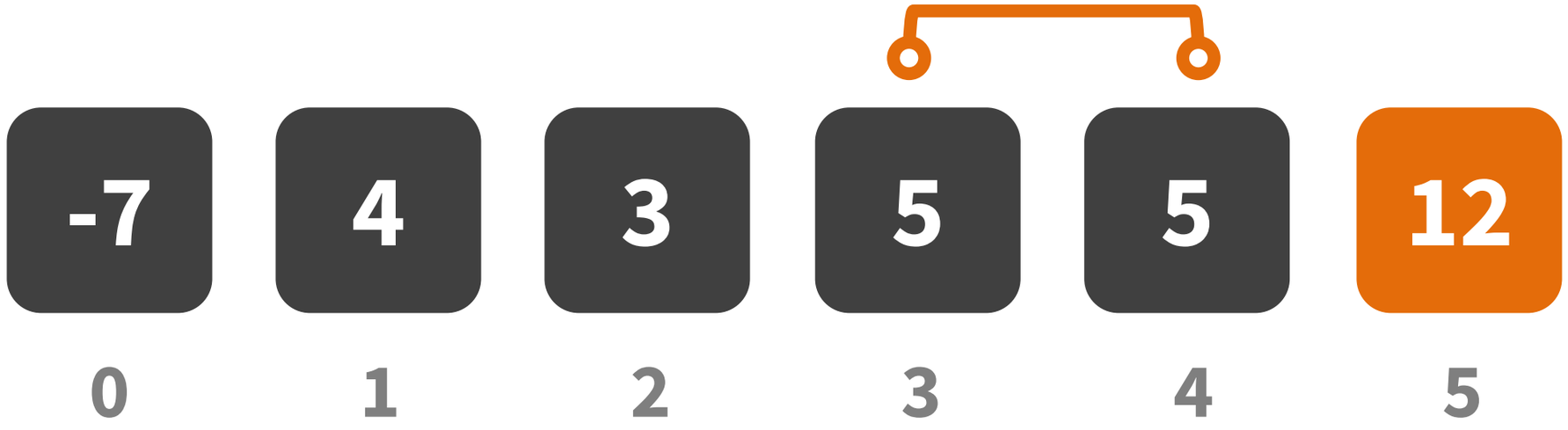

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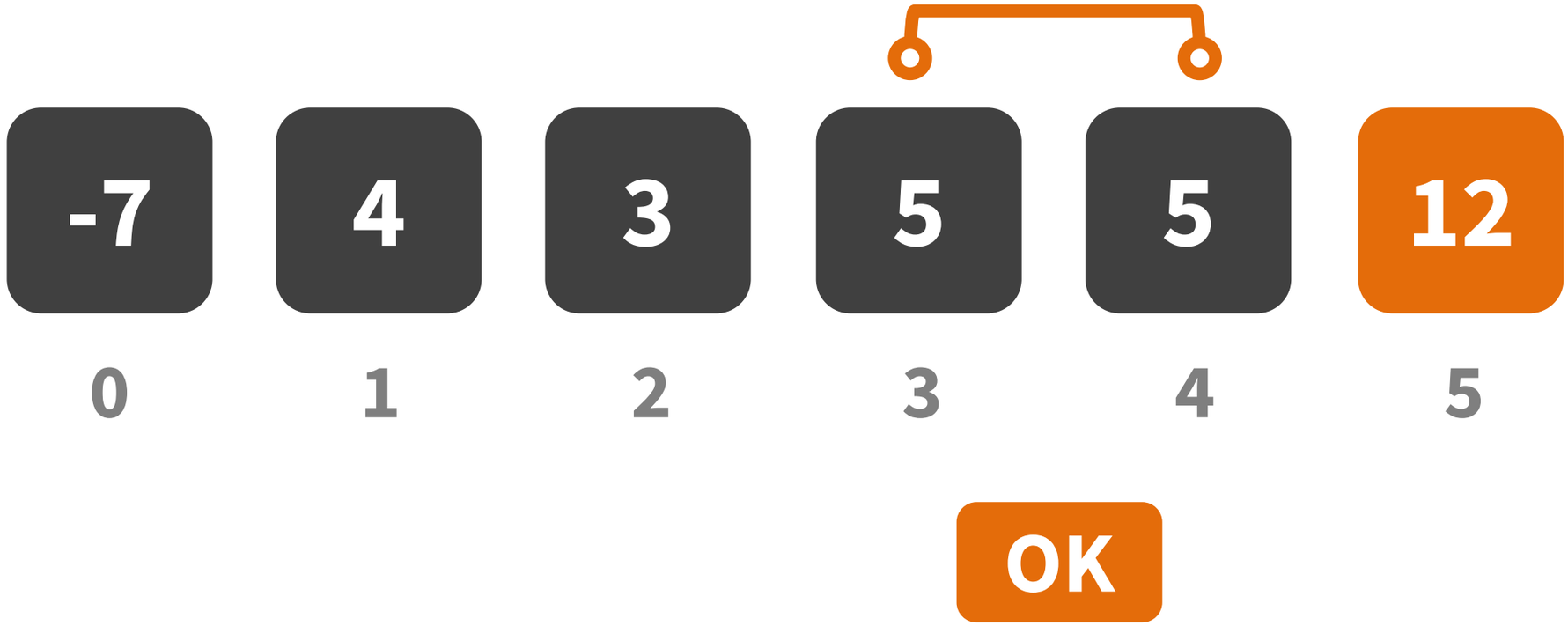

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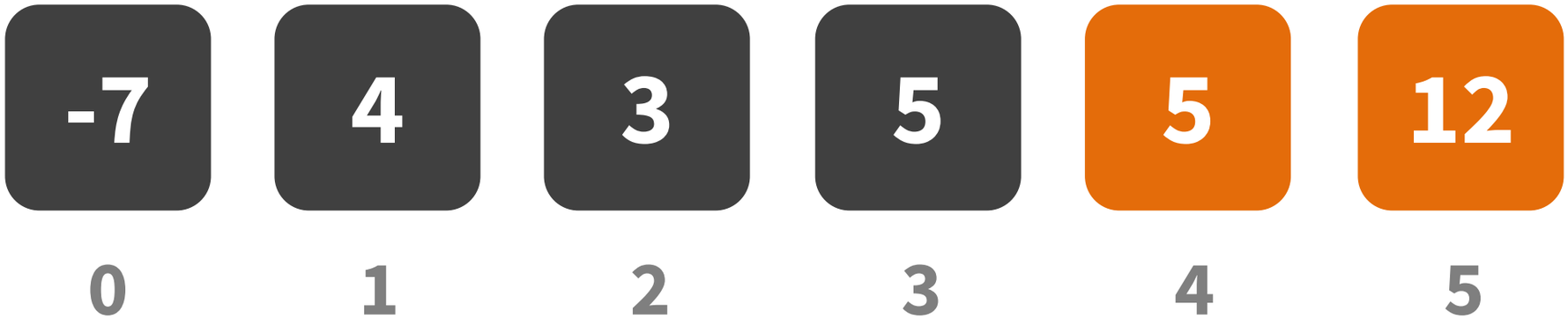
3. prechod poľom



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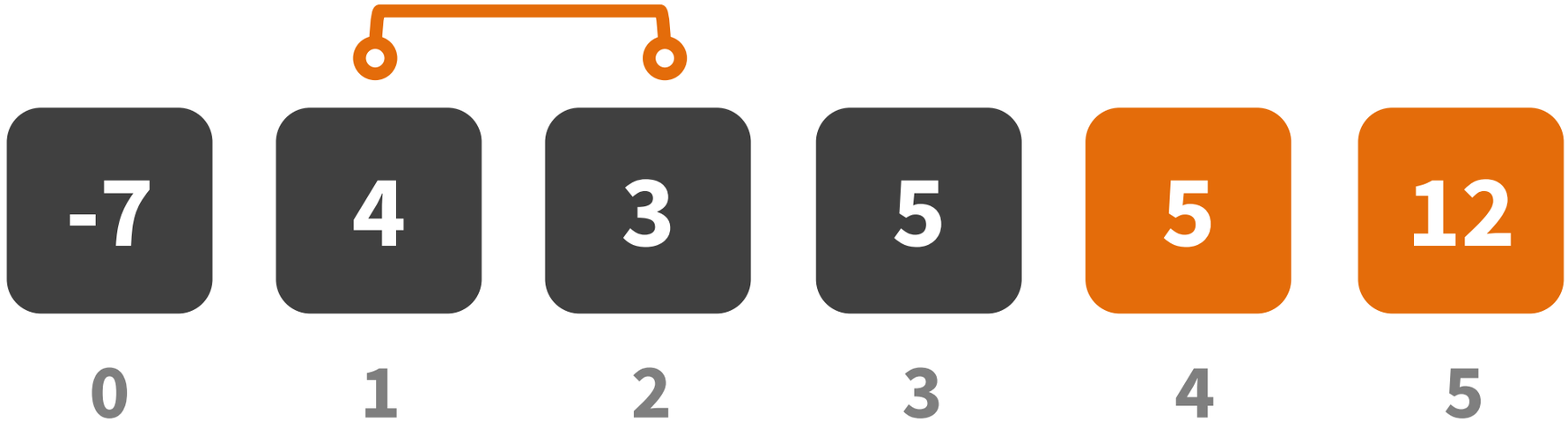

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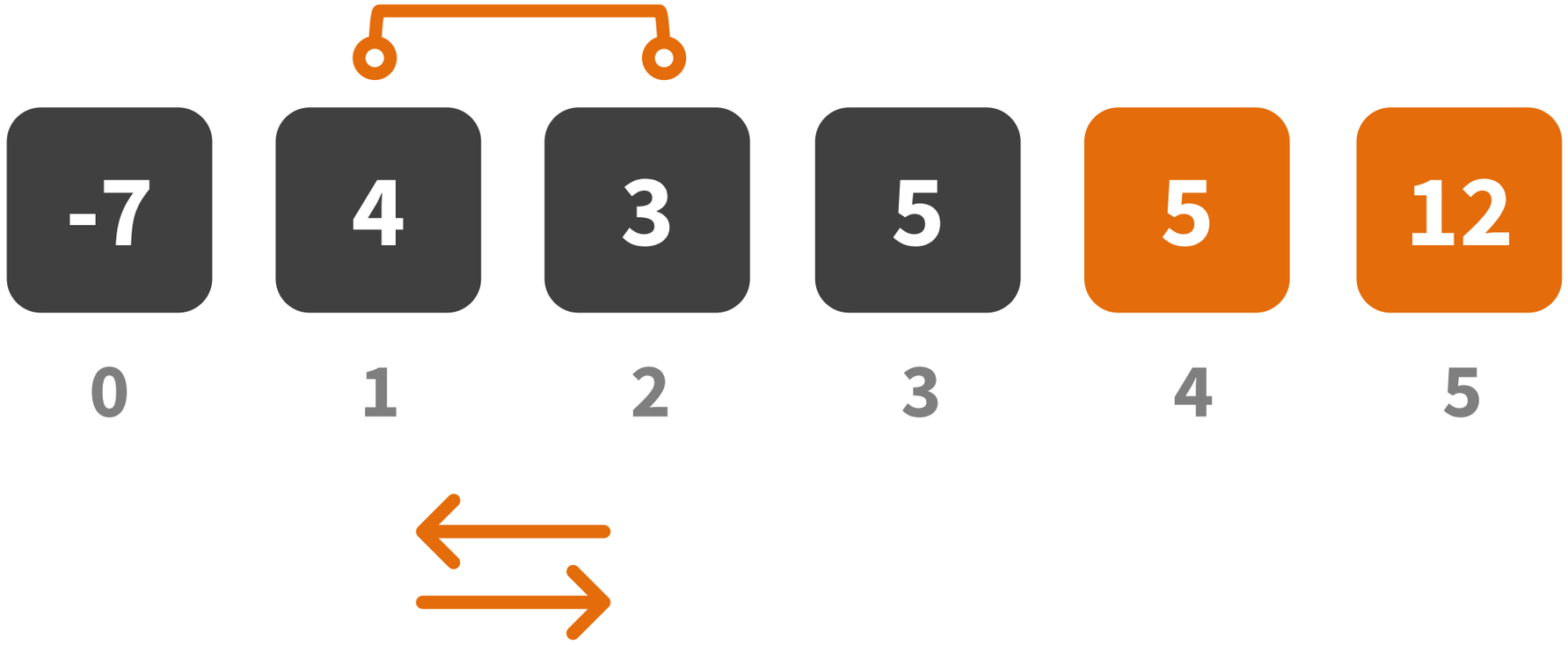

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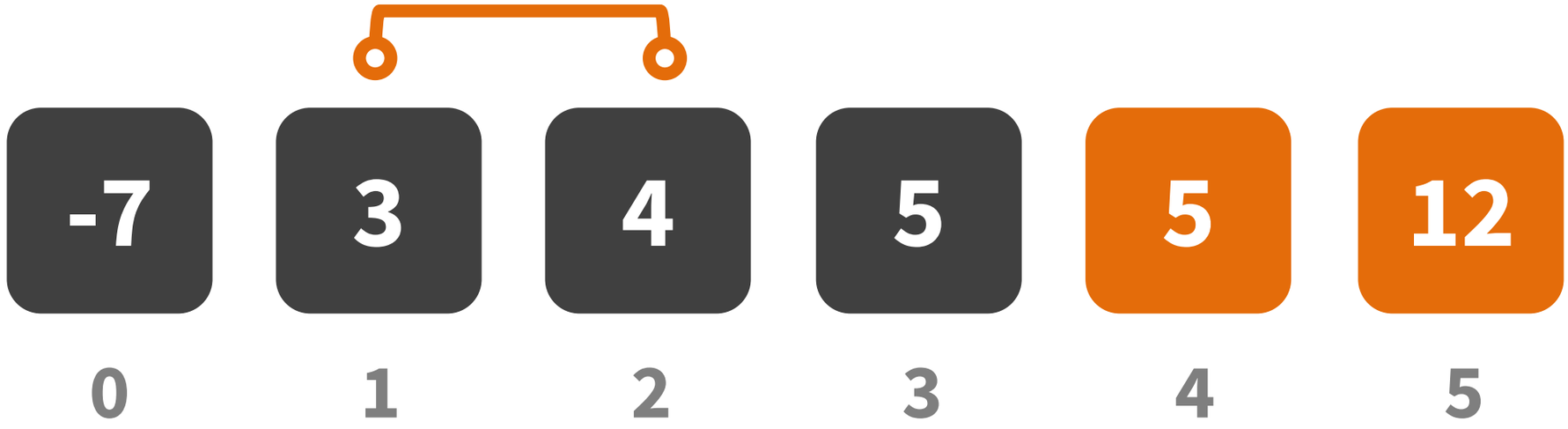

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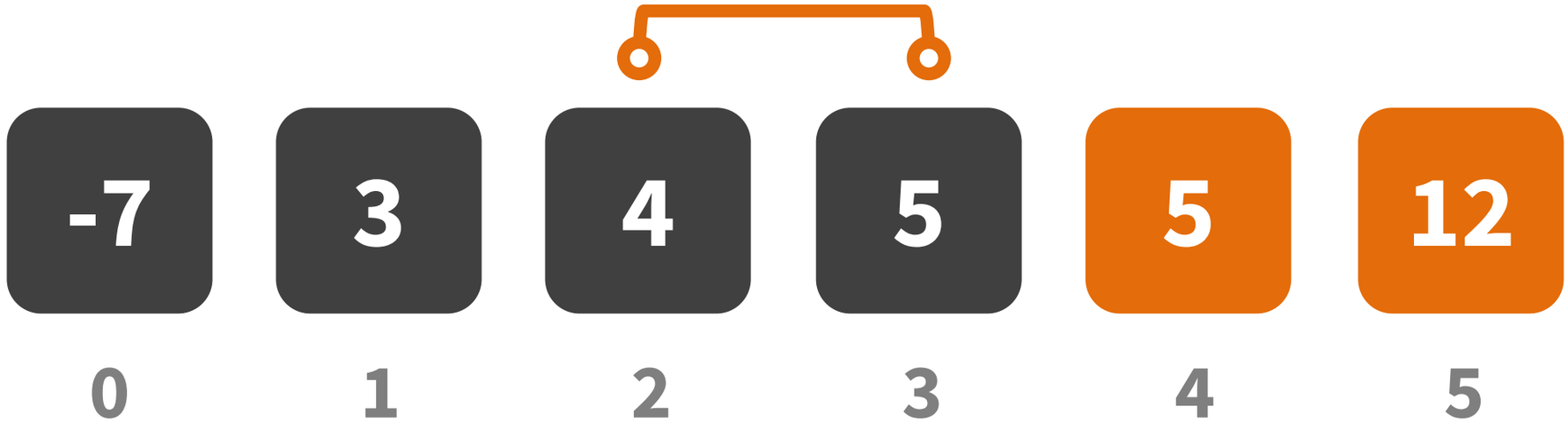

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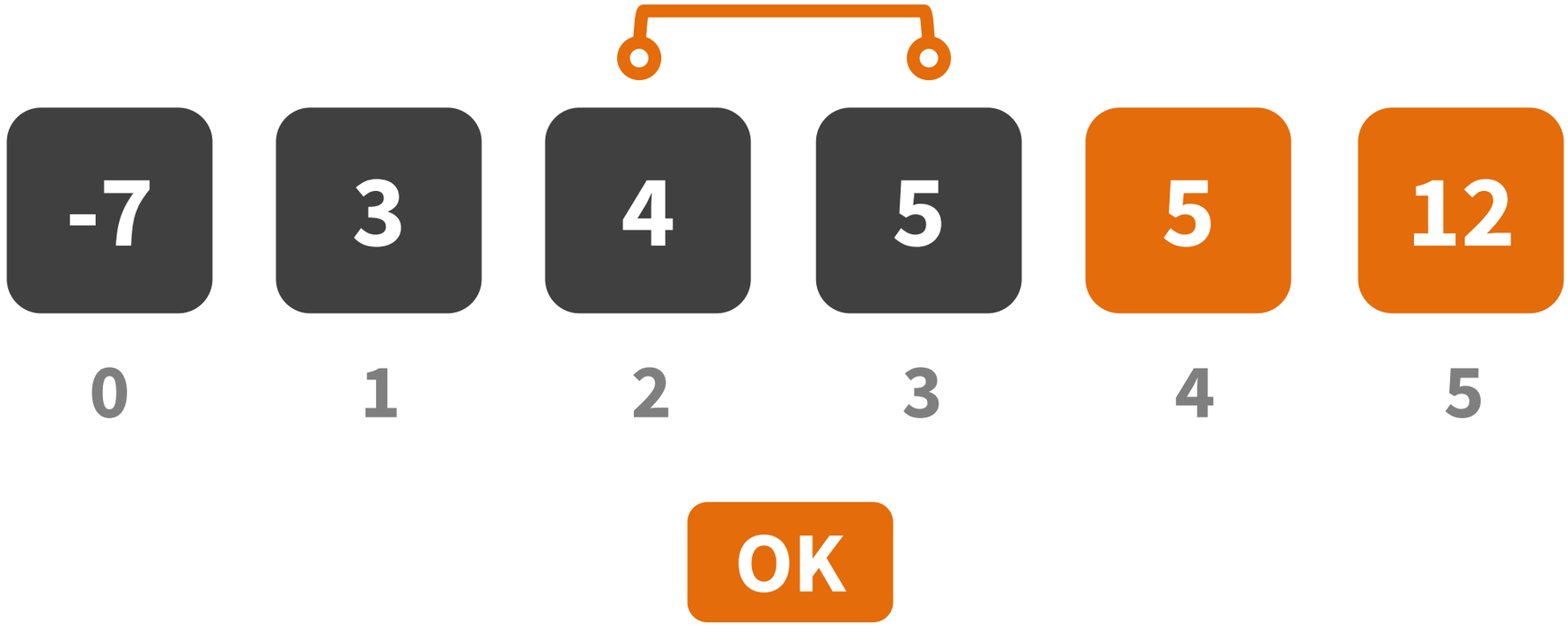

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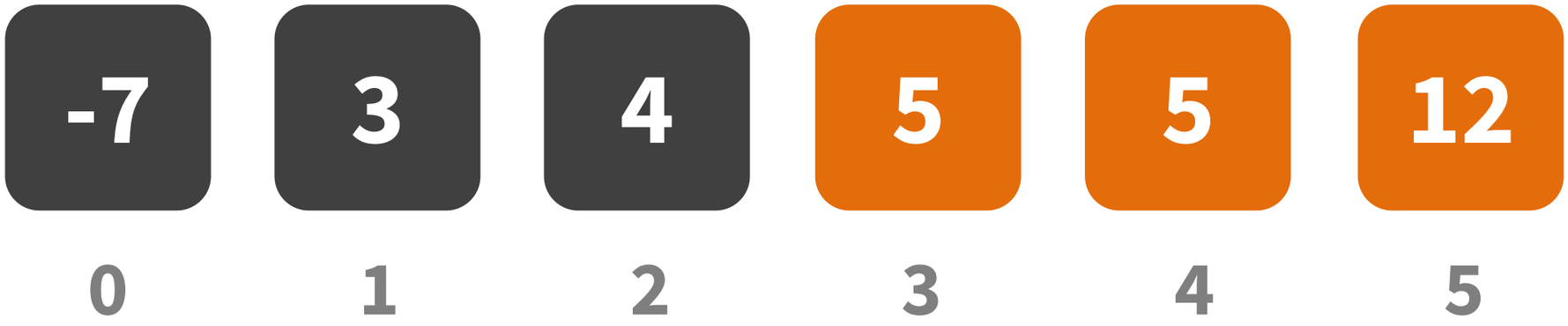
4. prechod poľom



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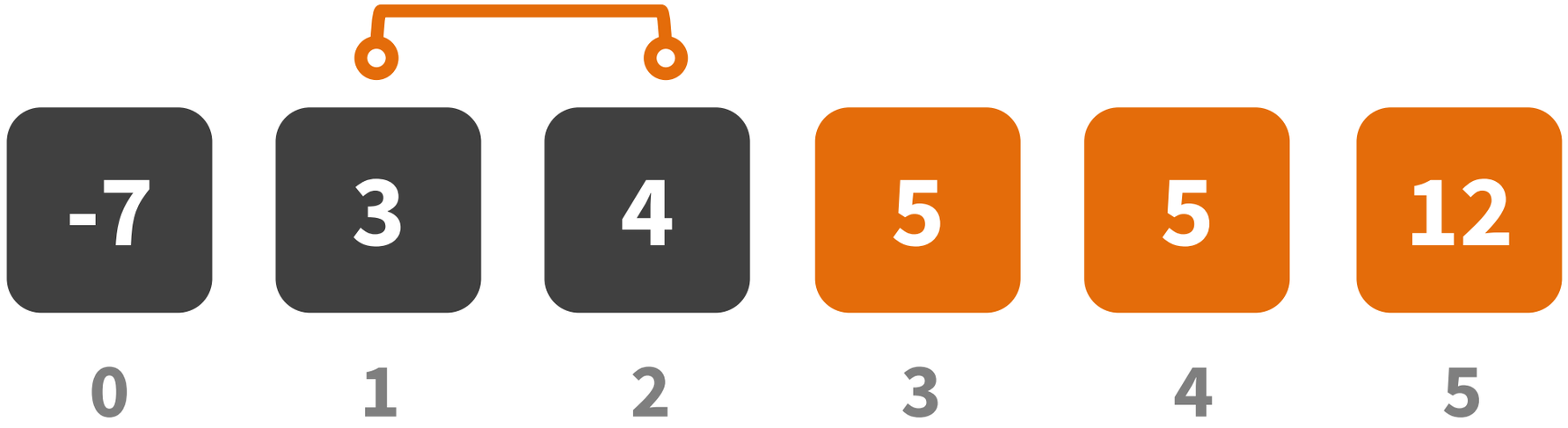

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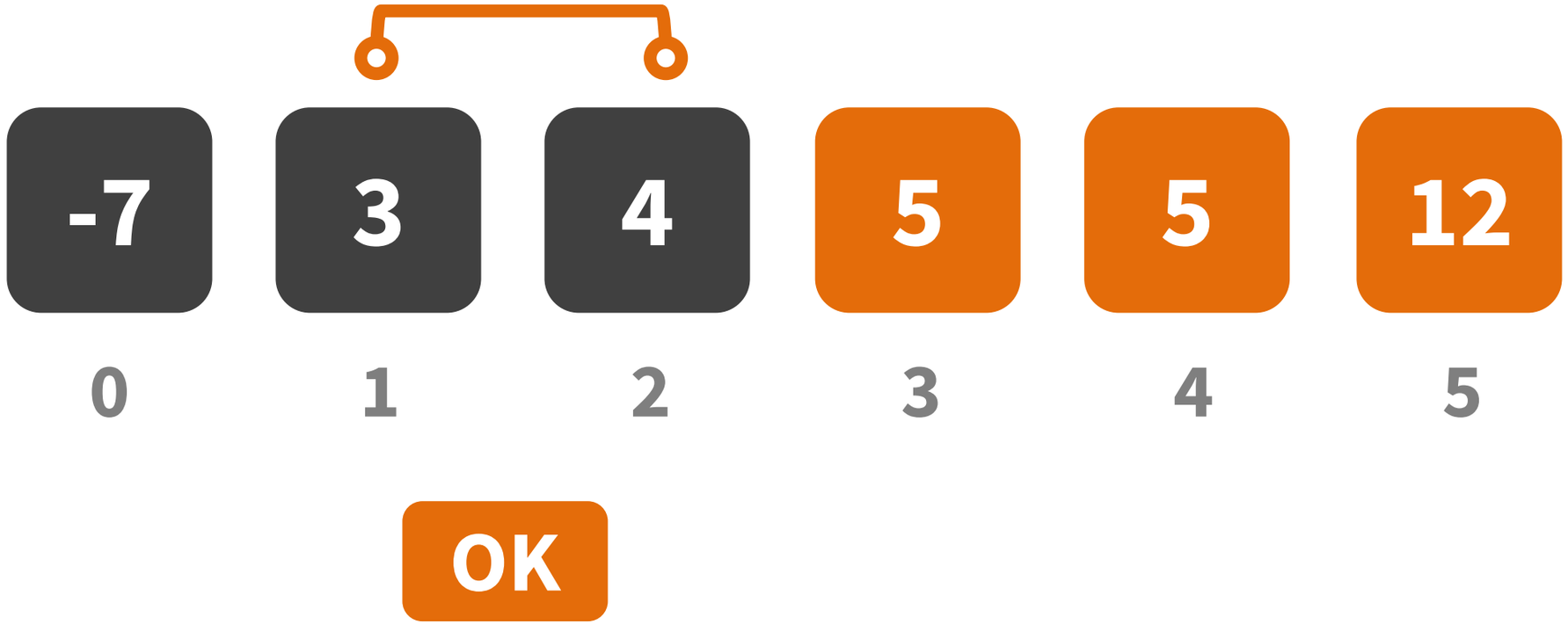

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5. prechod poľom

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Posledný prvok je na správnej pozícii.

1. prechod ✓
2. prechod ✓
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Pole je usporiadané

Analýza zložitosti

Počet prvkov poľa **n=6**

Počet prechodov poľom: **5** = (n-1)

Prechod	**1**	**2**	**3**	**4**	**5**
Počet porovnaní	5	4	3	2	1

Vzorová implementácia v C/C++