Divide & Conquer

- ✓ Powerful approach for solving conceptually difficult problems
- ✓ Often used to find an optimal solution of a problem.
- ✓ Decompose a given problem into two or more similar, but simpler, subproblems, to solve them in turn, and
- ✓ Compose their solutions to solve the given problem.

Divide & Conquer

3 Step Process

1. Divide. Divide the problem into a set of subproblems
2. Conquer. Solve each subproblem recursively.
3. Combine. Combine the results of each subproblem.

Count the number of ones

Given a binary sorted array, find the number of ones

Example 1:

Input: nums =[0,0,0,0,1,1,1]
Output: 3

Count the Ones

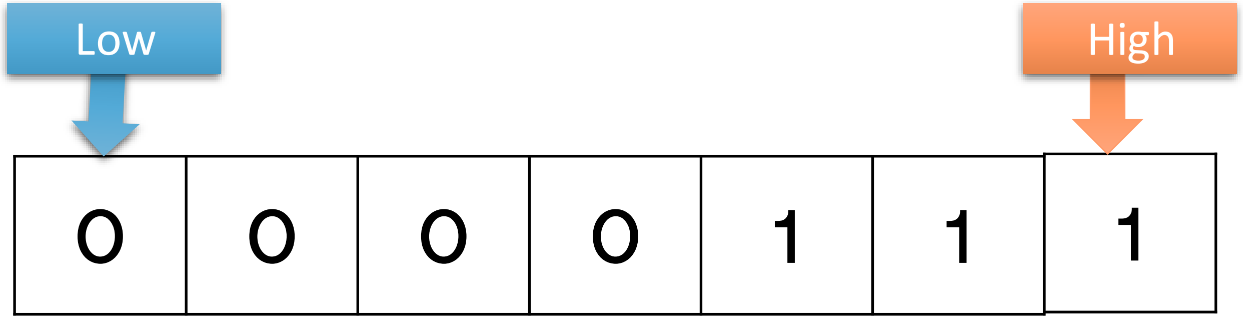
0	0	0	0	1	1	1

Rules to break the recursion:

1) Numbers on right is 0, then return count as 0
2) Numbers on left is 1, return (right – left + 1)

- ✓ 2 Index (left at 0 and right at length-1)
- ✓ Find the mid => (left + right) / 2 (and divide into half)
- ✓ Recursively call the left index to mid point to get count
- ✓ Recursively call the mid+1 to right index to get count
- ✓ Add the left recursive sum with right recursive sum

Count the Ones



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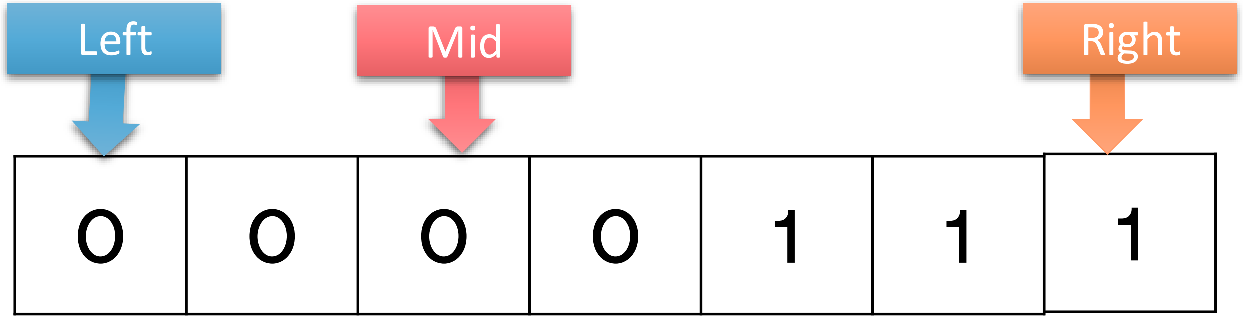

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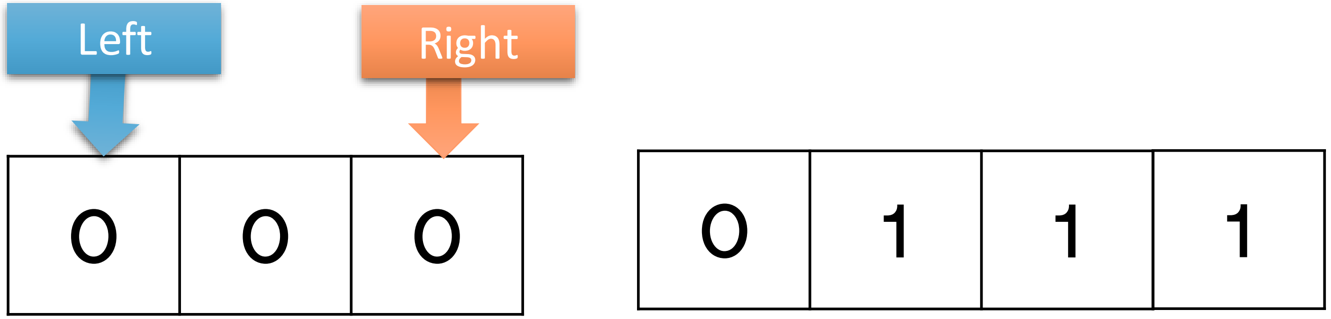

Left

Right

0	0	0

0	1	1	1

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0

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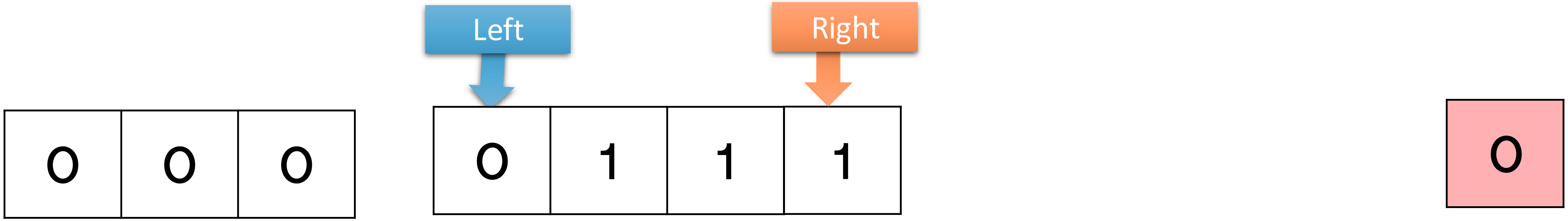

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0	1	1	1

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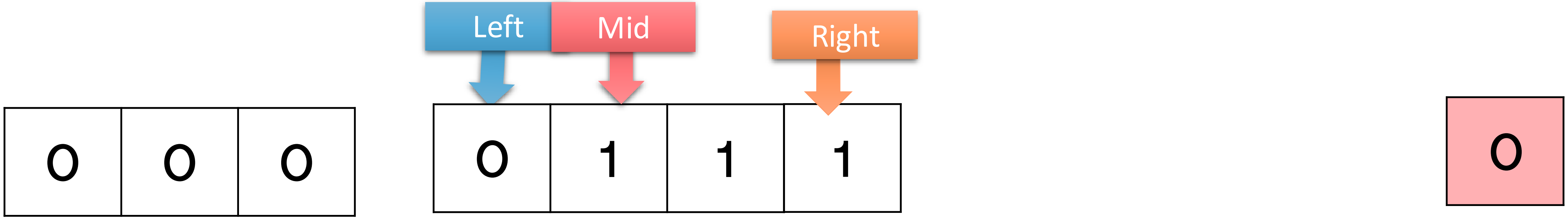

Left

Mid

Right

0	0	0

0	1	1	1

0

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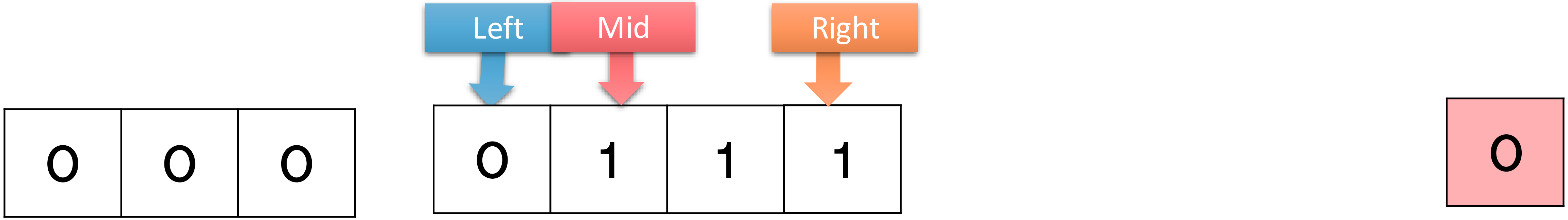

Left Mid Right

0	0	0

0	1	1	1

0

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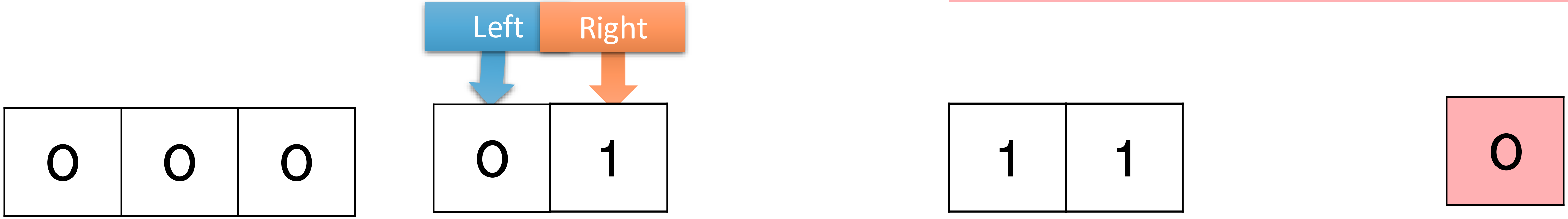

Left

Right

0 0 0

0 1

1 1

0

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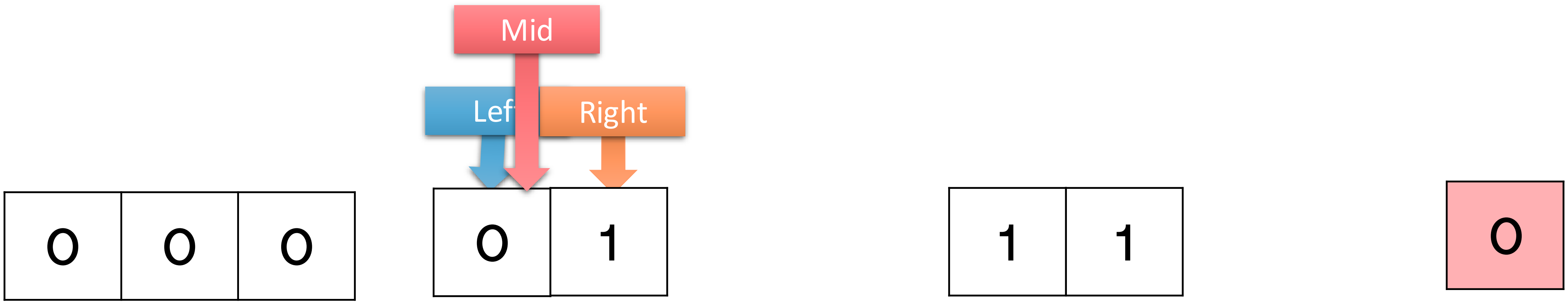

Mid

Left

Right

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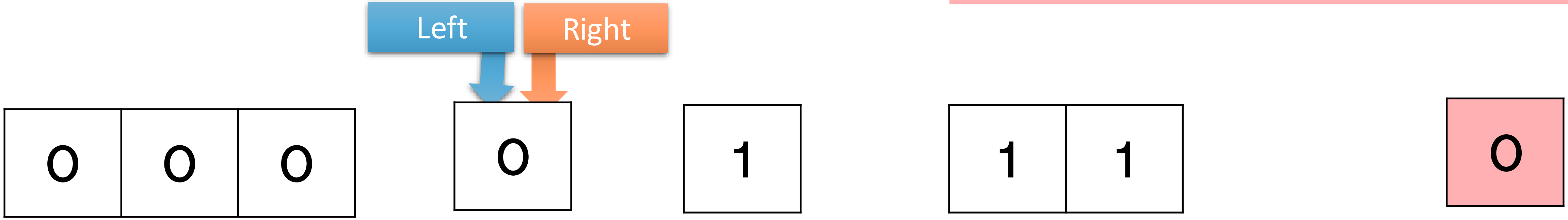

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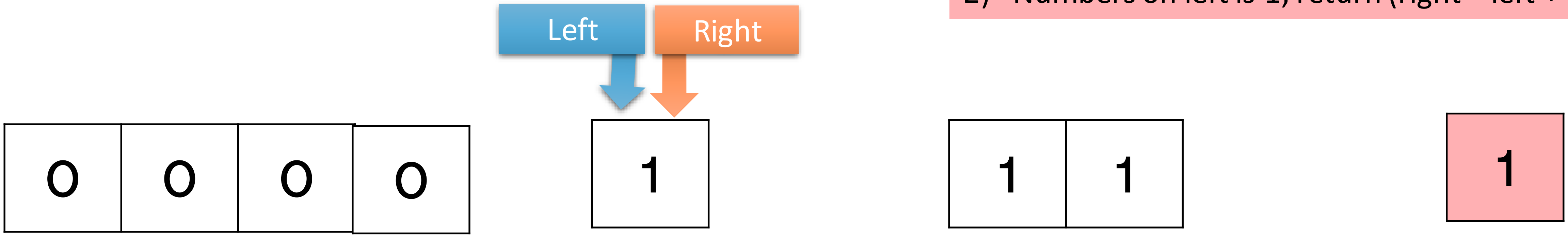

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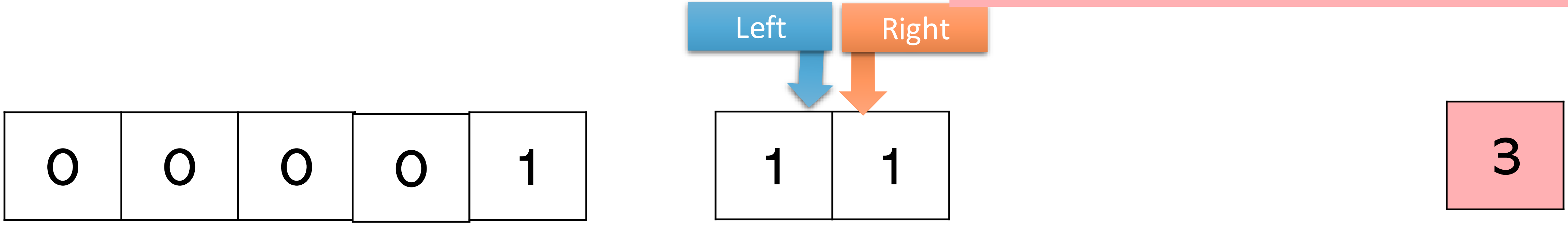

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