LZ77 – Exercise

Multimedia Technology

Tutorial 2, section 2a

LZ77

Assume we are applying LZ77 encoding with a 4+4 character window, starting with the left part of the window empty.

Show how the sequence "aababbbbbbb" is encoded and how the output from the encoder is decoded.

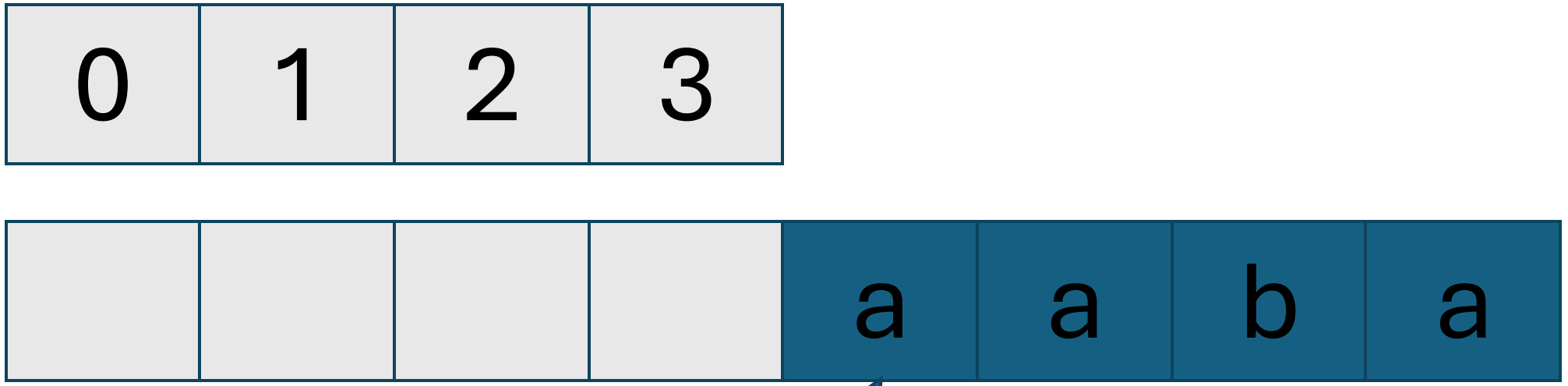
aababbbbbb

In each step, we need to:

- Select as **input** from the right window the maximum number of symbols that we can match in the left window.
- Extract the code (o,l,c)
  where **o** is the index of the left position,
  where **l** (L lowercase) is the length of the matched string,
  and **c** is the next symbol we did not match.
- In the next step we slide to the right by the number of symbols matched (n+1)

Step 1

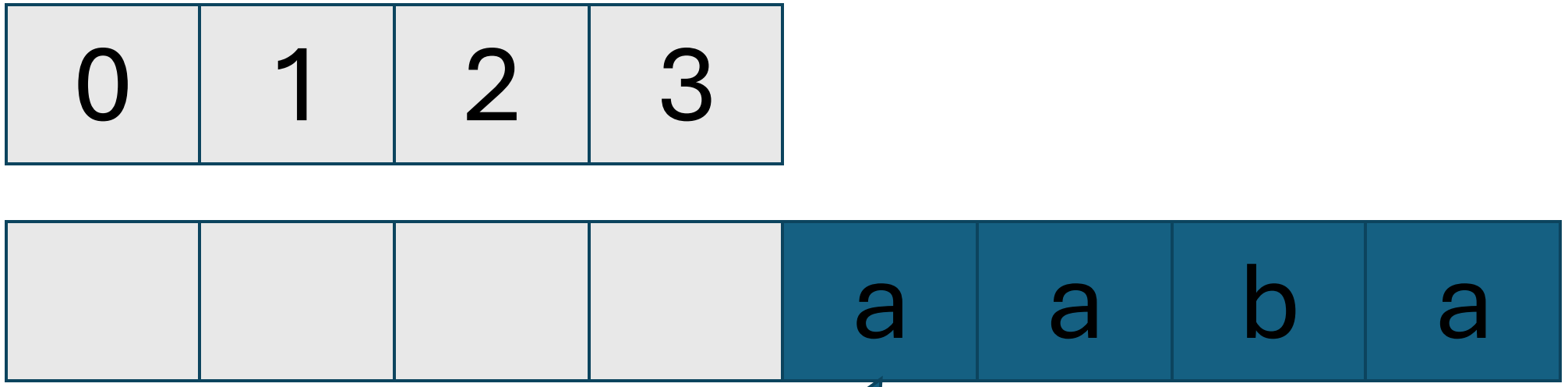
aababbbbbb



The initial window is empty (4 empty cells).

Step 1

aababbbbbb



The initial window is empty (4 empty cells).

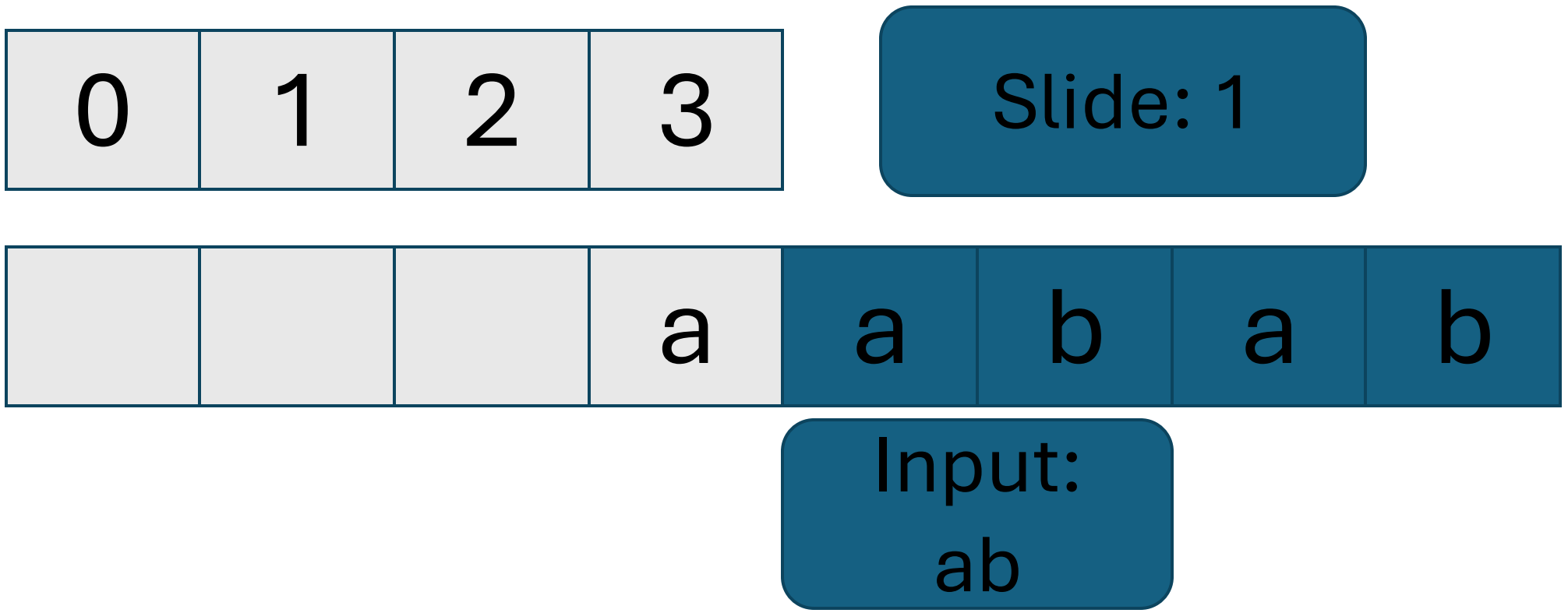
Input: a

Code: (0,0,a)

We don't have a match

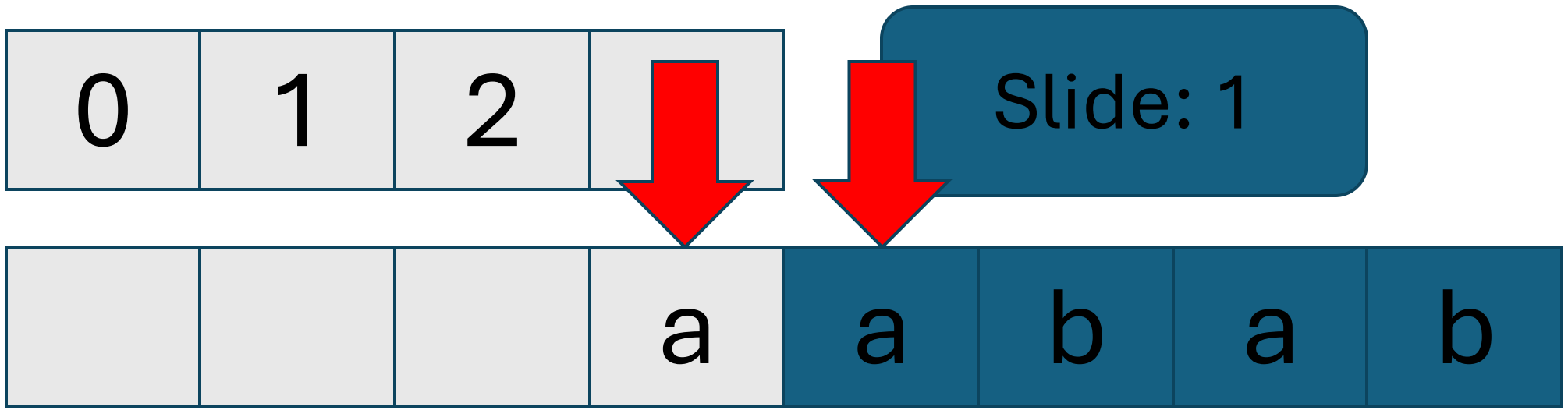
Step 2

aababbbbbb



Step 2

aababbbbbb



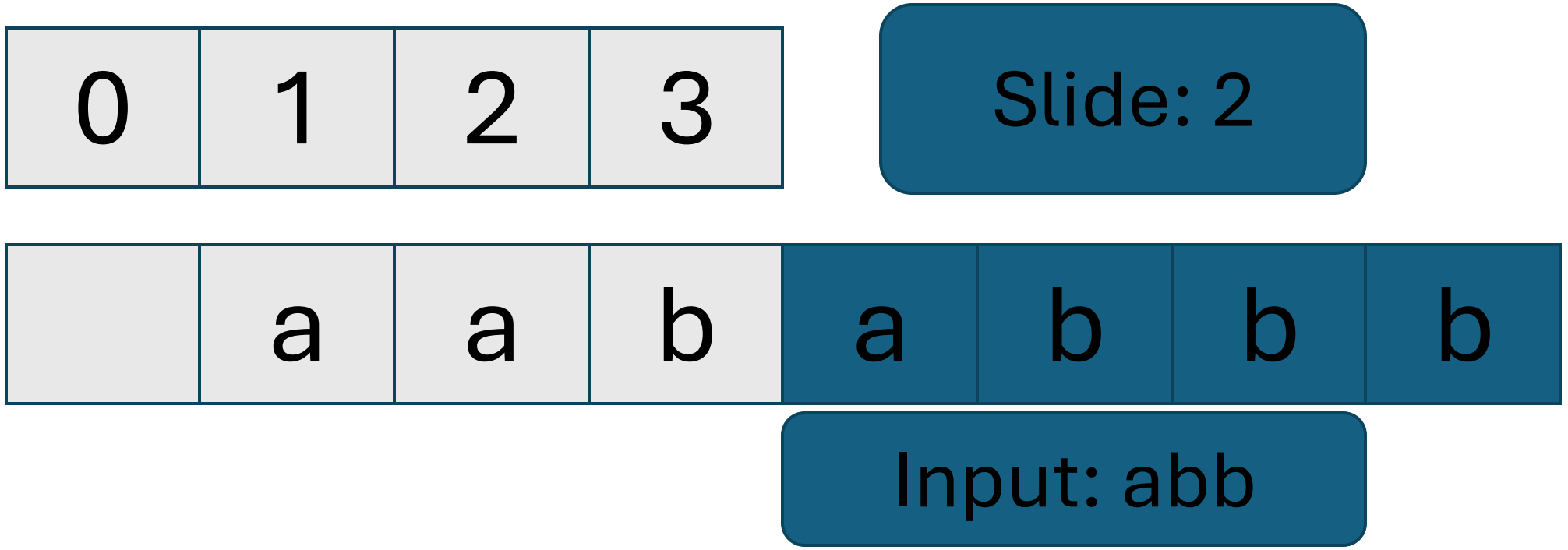
Input:
ab

Code: (3,1,b)

We matched the 'a' (1st on the right) with the 'a' at position 3 (from the left).

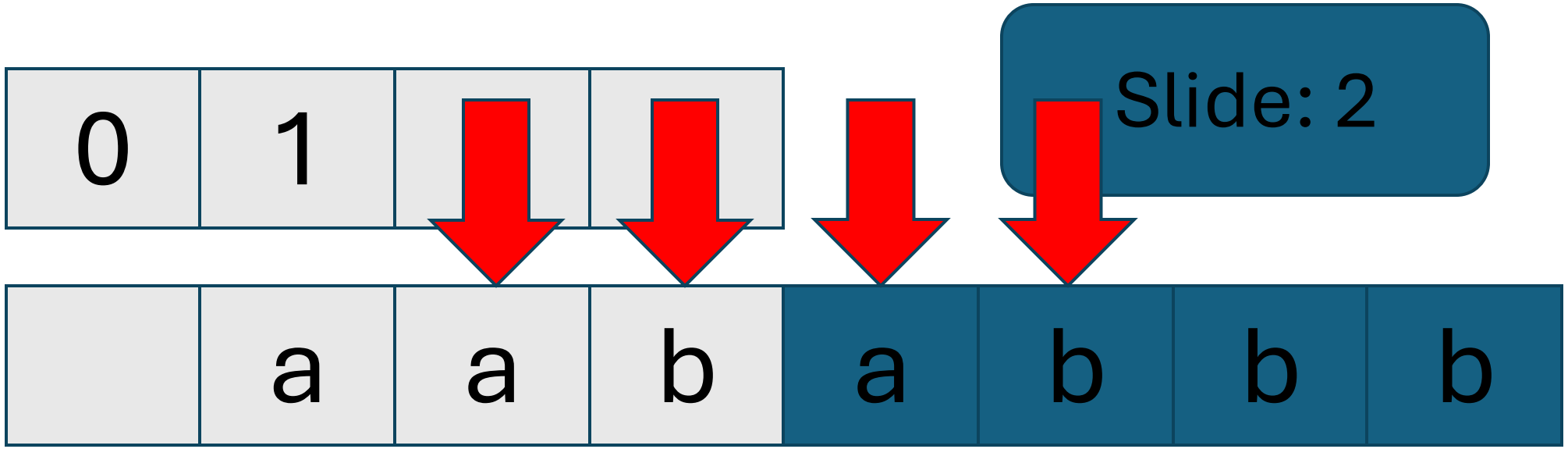
Step 3

aababbbbbb



Step 3

aababbbbbb



Code: (2,2,b)

We matched ab with ab at position 2(from the left)

Step 4

aabaabbbbb

0	1	2	3

Slide: 3

b	a	b	b	b	b	b	b

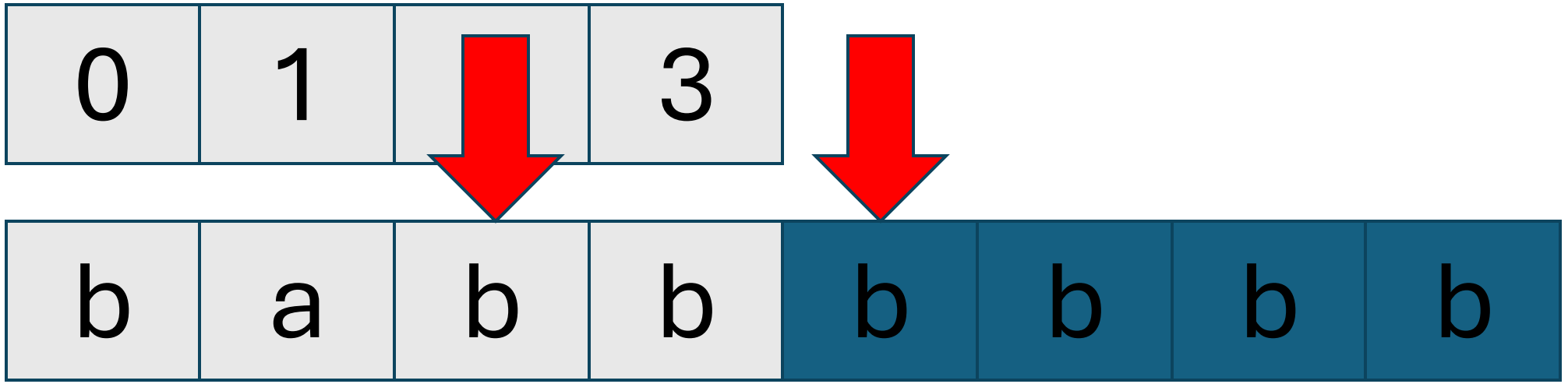
Input: bbbb

Code: (2,3,b)

We matched 3 'b' from the right with 3 'b' from the left

Step 4

aabaabbbbb



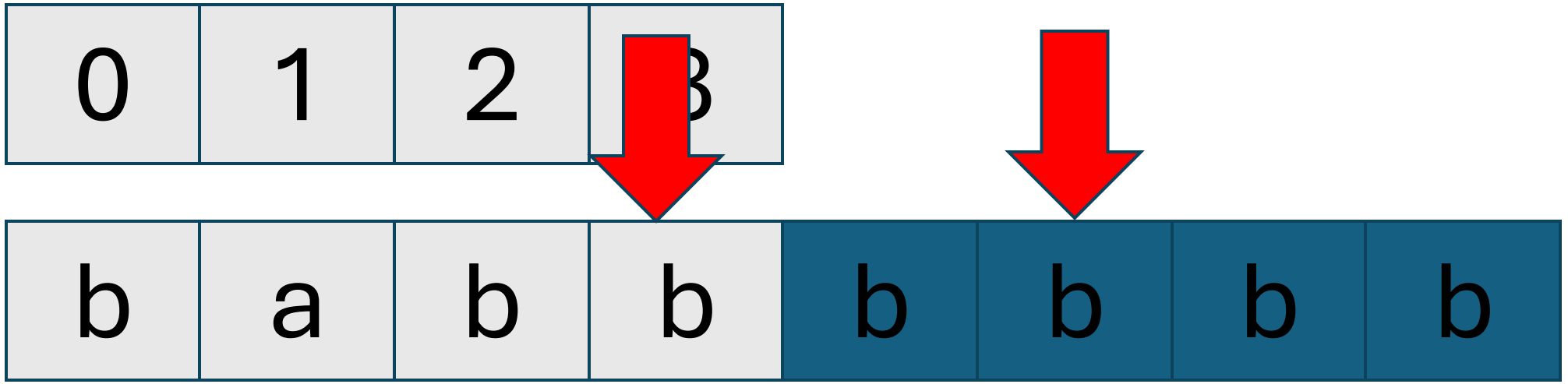
Input: bbbb

Code: (2,3,b)

We matched 3 'b' from the right with 3 'b' from the left

Step 4

aabaabbbbb

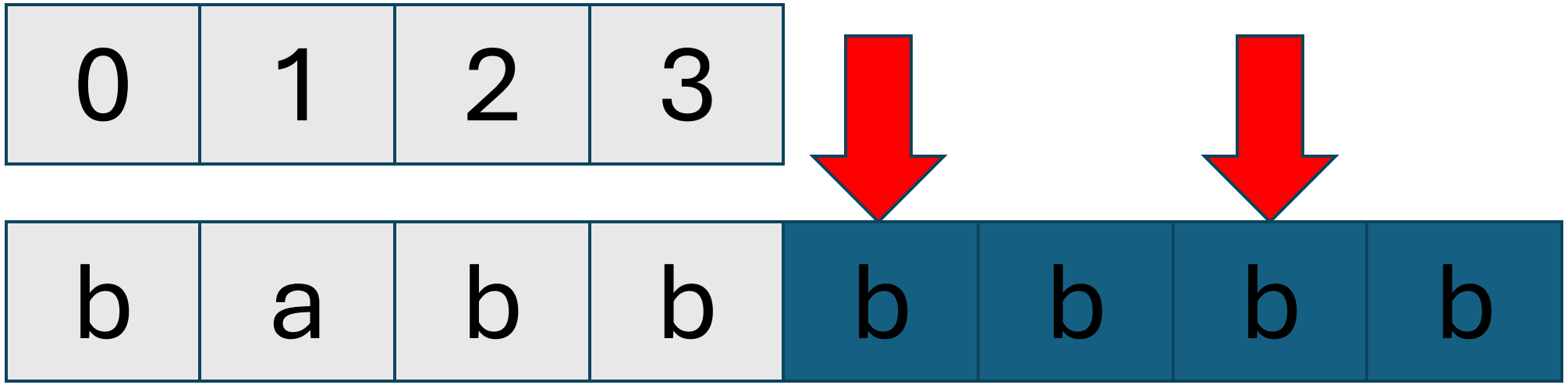


Input: bbbb

Code: (2,3,b)

We matched 3 'b' from the right with 3 'b' from the left

aabaabbbbb



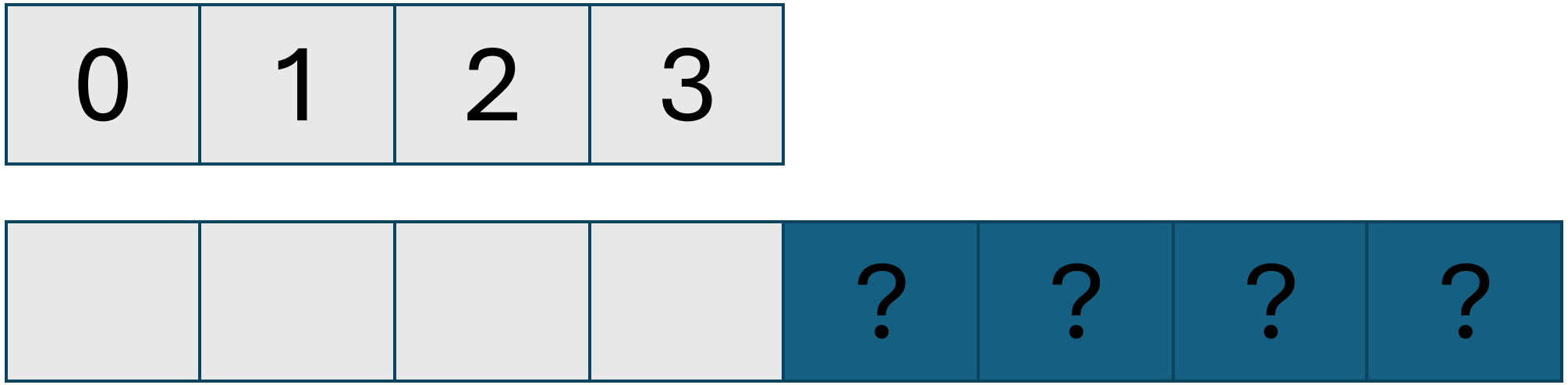
Input: bbbb

Code: (2,3,b)

We matched 3 'b' from the right with 3 'b' from the left

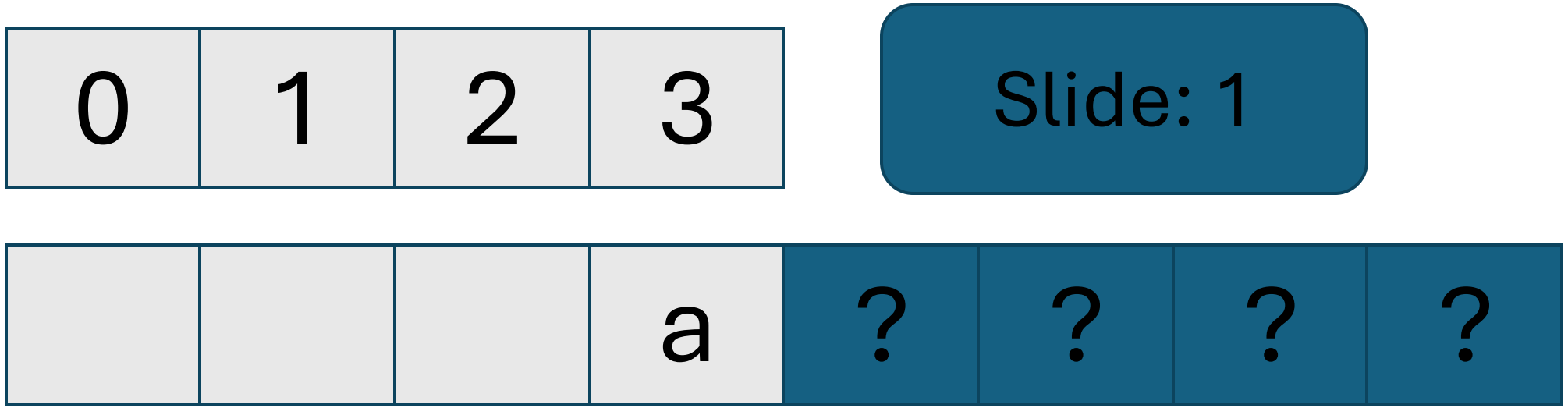
Decoding the output from the encoder.

Step 1



Code: (0,0,a)

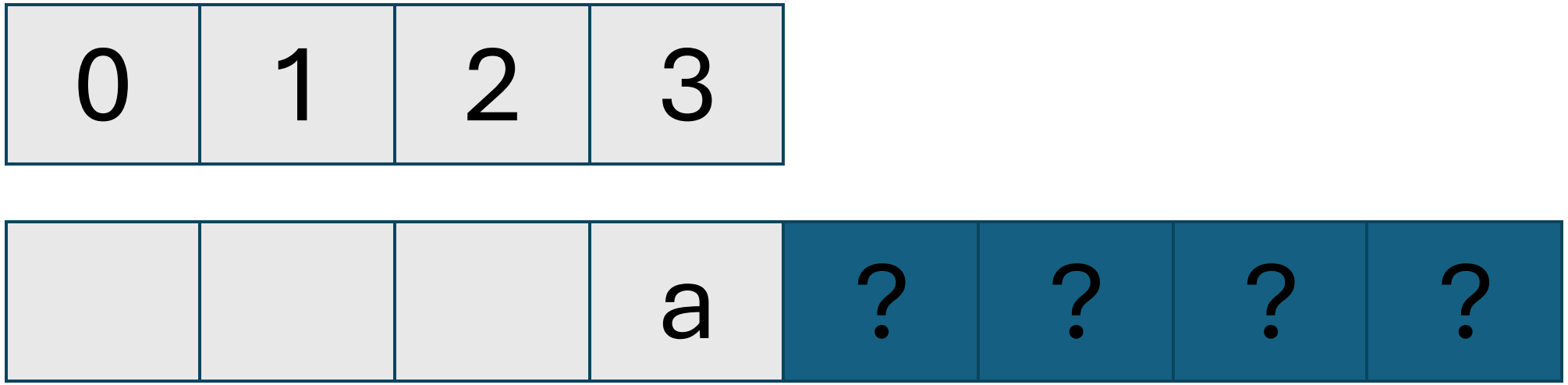
Step 1



Code: (0,0,a)

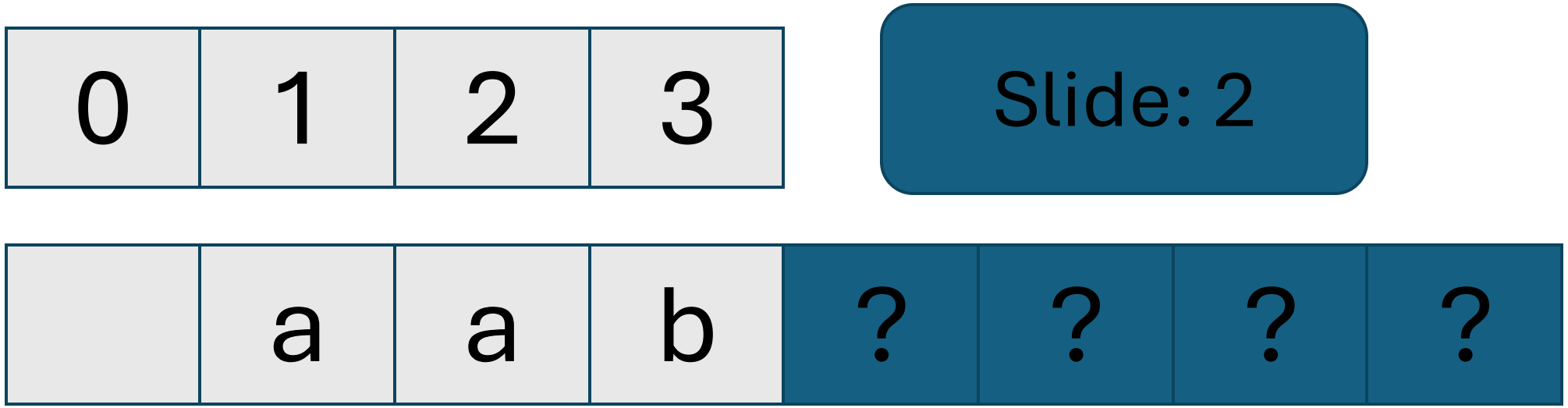
Output: a

Step 2



Code: (3,1,b)

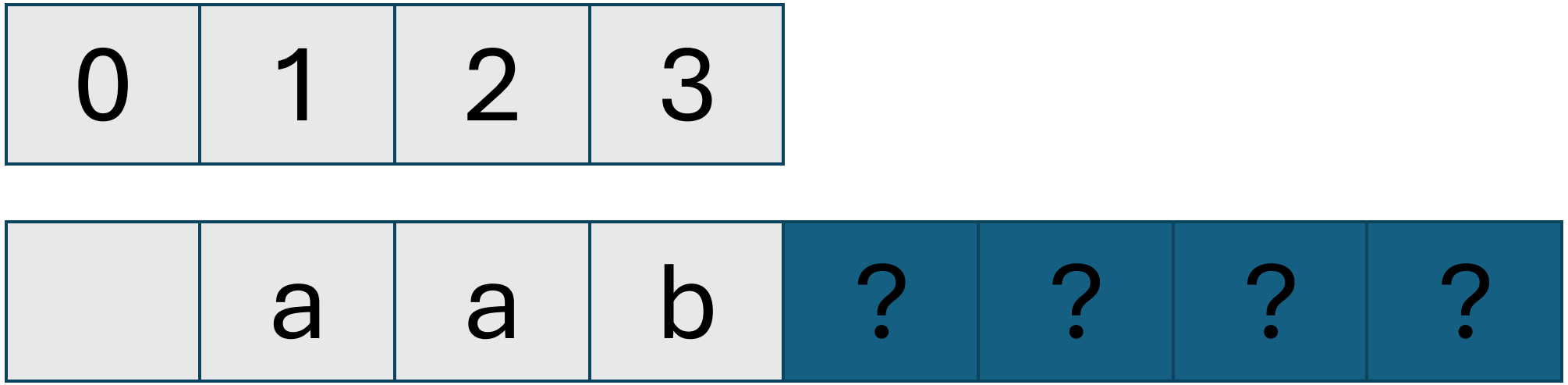
Step 2



Code: (3,1,b)

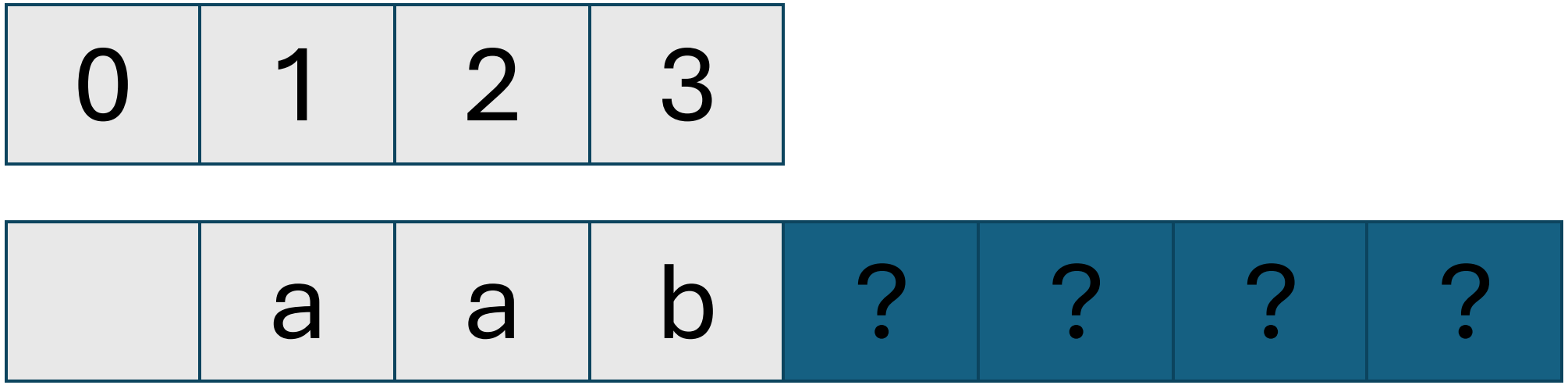
Output: ab

Step 3



Code: (2,2,b)

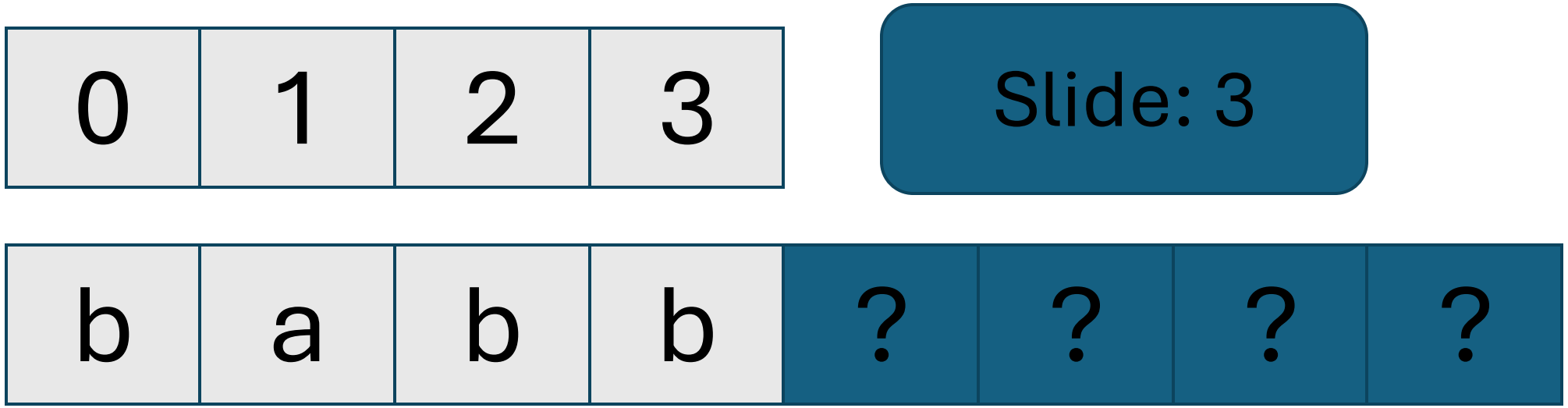
Step 3



Code: (2,2,b)

Output: abb

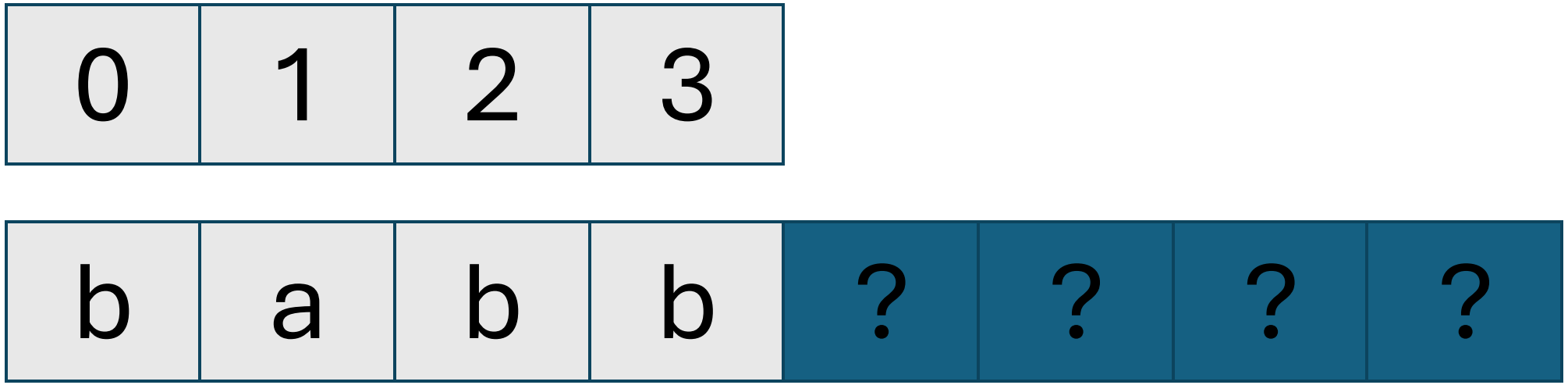
Step 4



Code: (2,2,b)

Output: abb

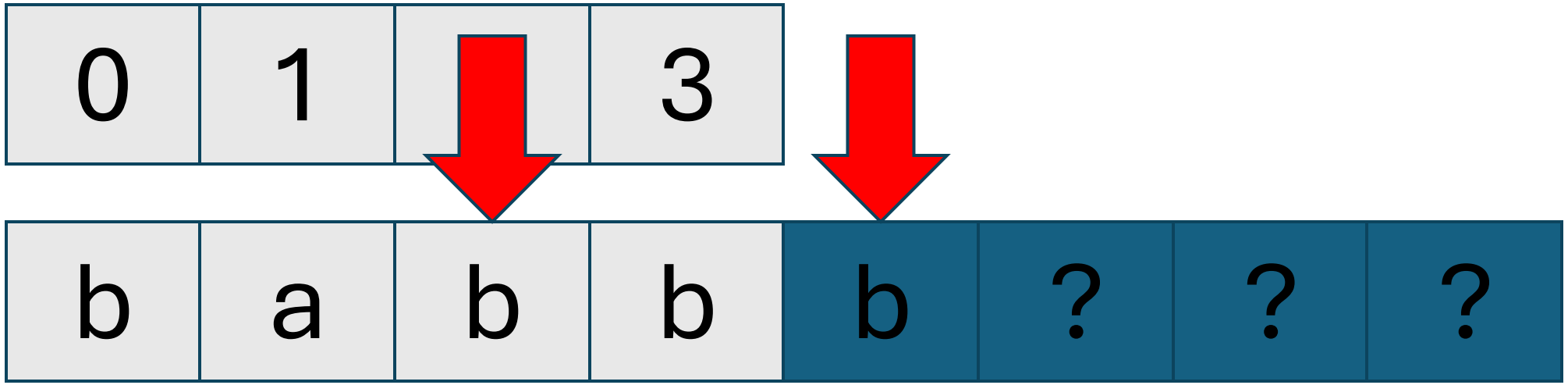
Step 4



Code: (2,3,b)

I have to copy 3 'b's from position 2 onwards

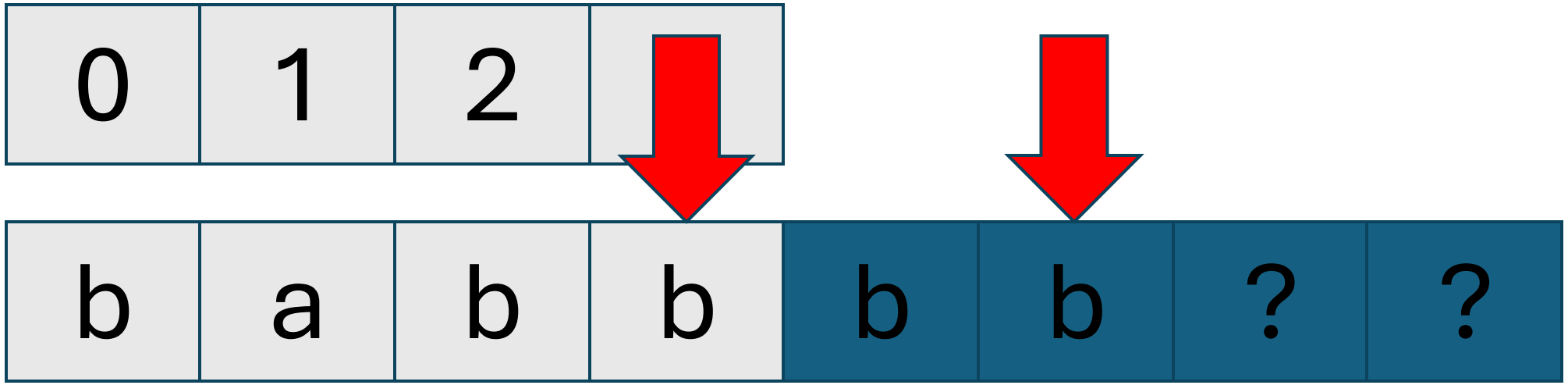
Step 5



Code: (2,3,b)

1st b

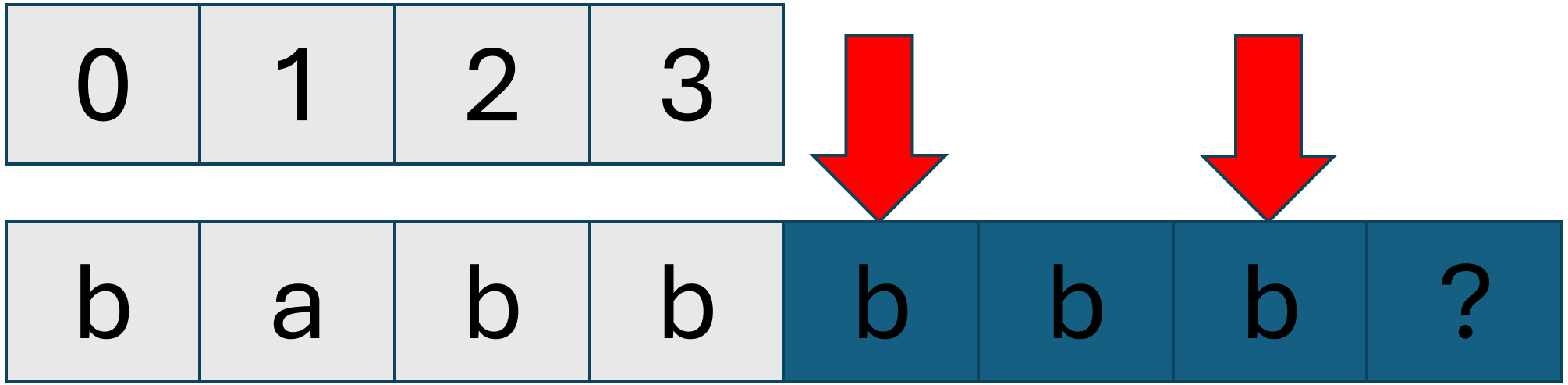
Step 5



Code: (2,3,b)

2nd b

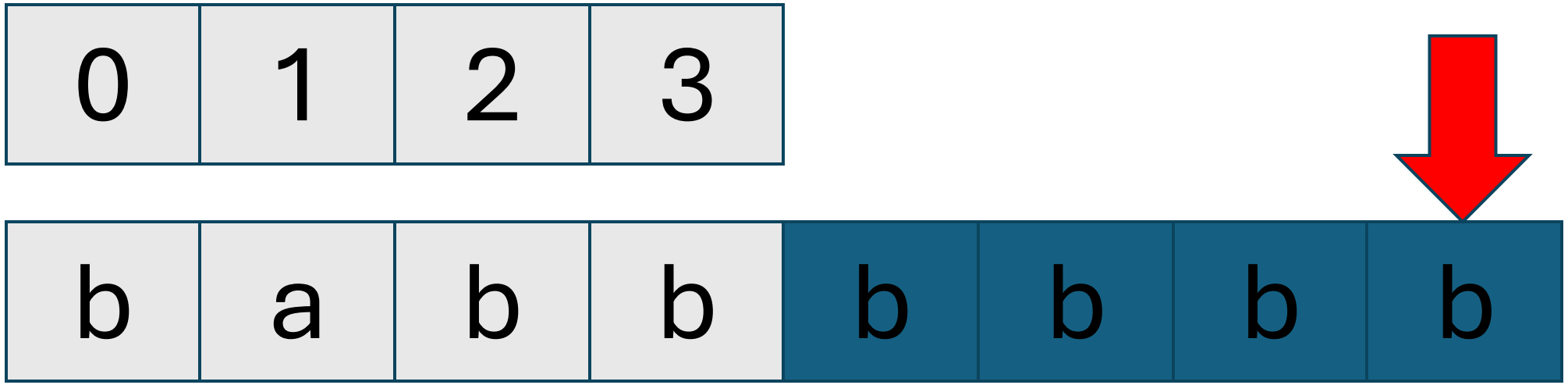
Step 5



Code: (2,3,b)

3rd b

Step 6



Code: (2,3,b)

I add the final b (the symbol that I know from the code wasn't matched)