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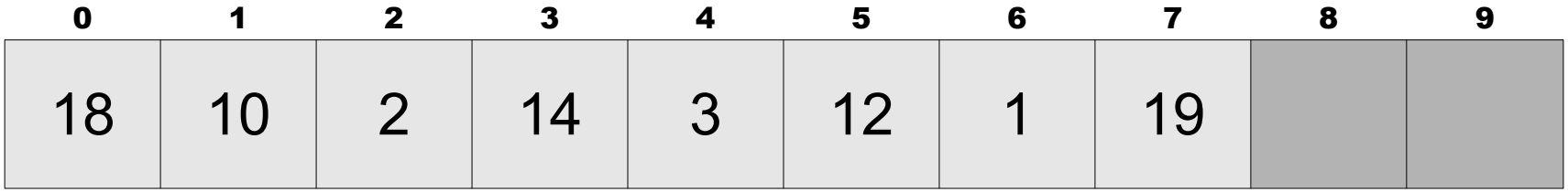
(insert each element into a sorted partition)



Slides by **Sean Szumlanski**

for **CS106B**, Programming Abstractions

Summer 2024

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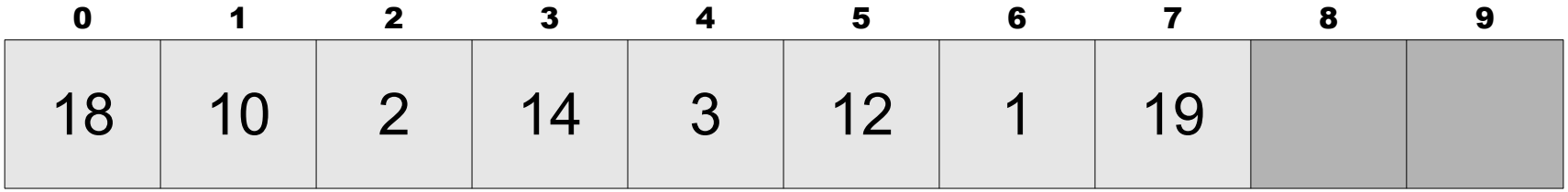

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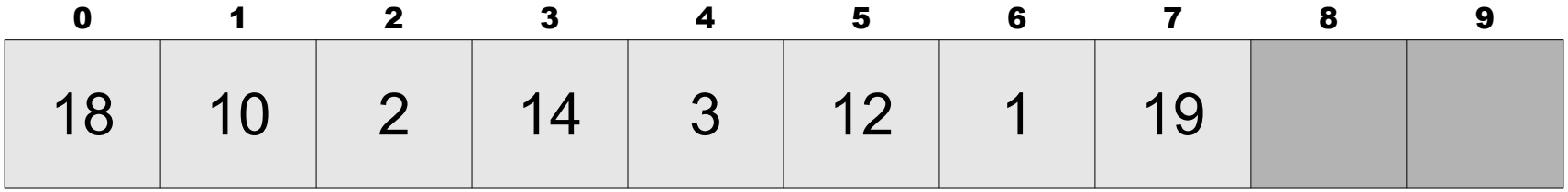

Initially, consider the first element to constitute a separate, **sorted** vector.

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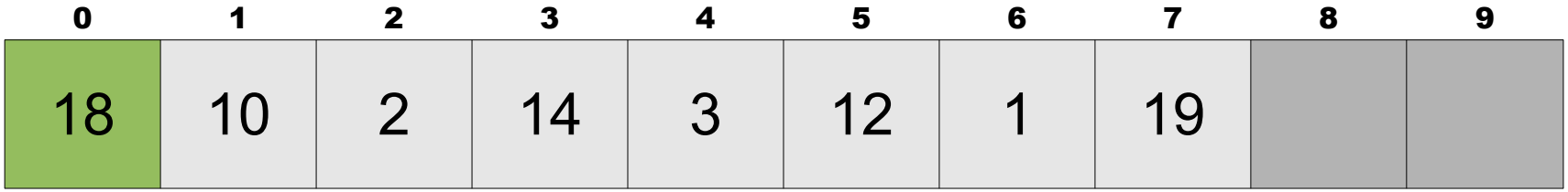

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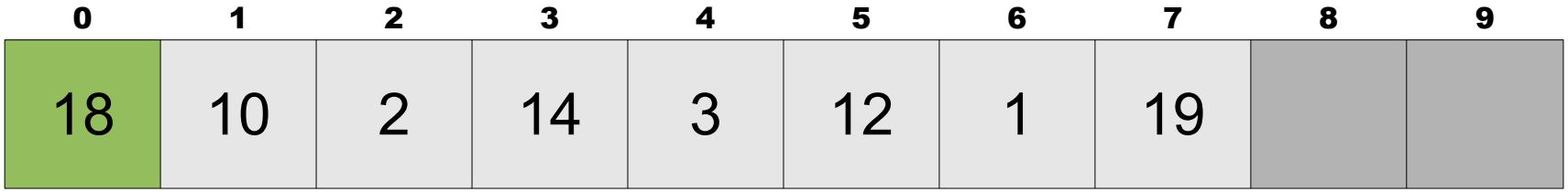

Now pull the first element out of the **unsorted** partition of the vector.

Insertion Sort

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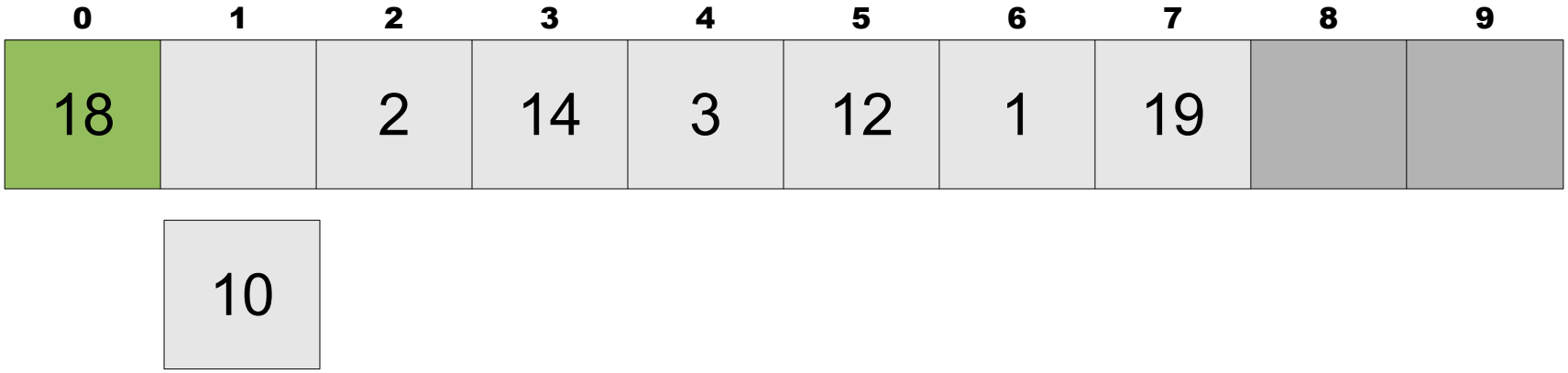

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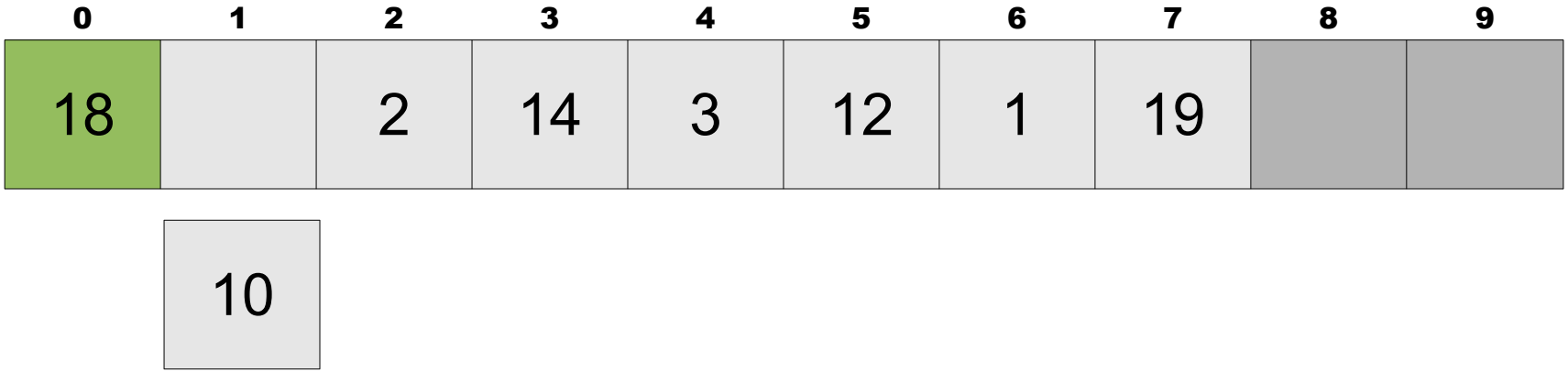

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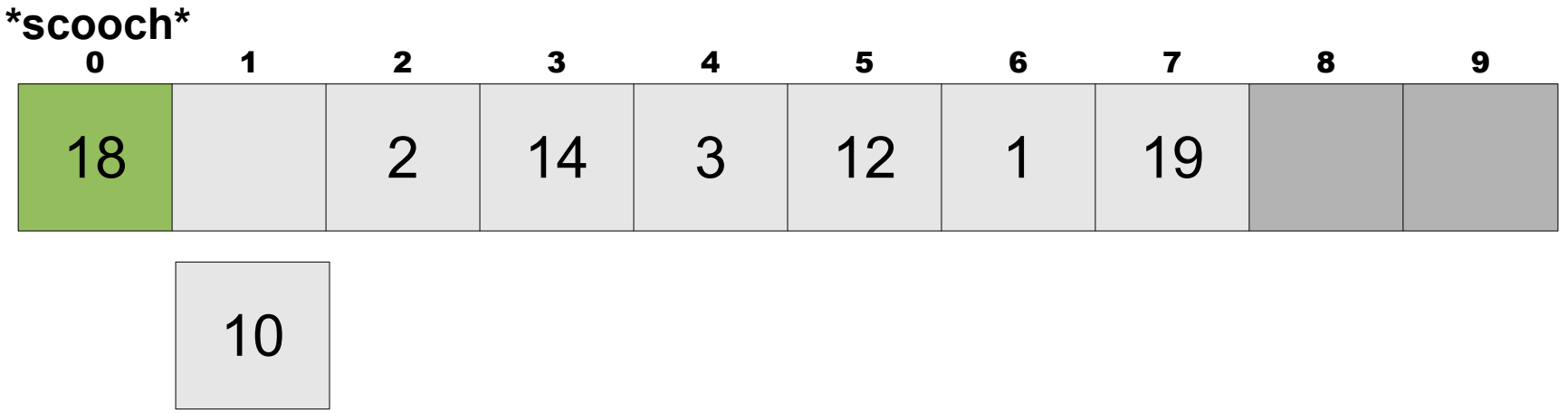

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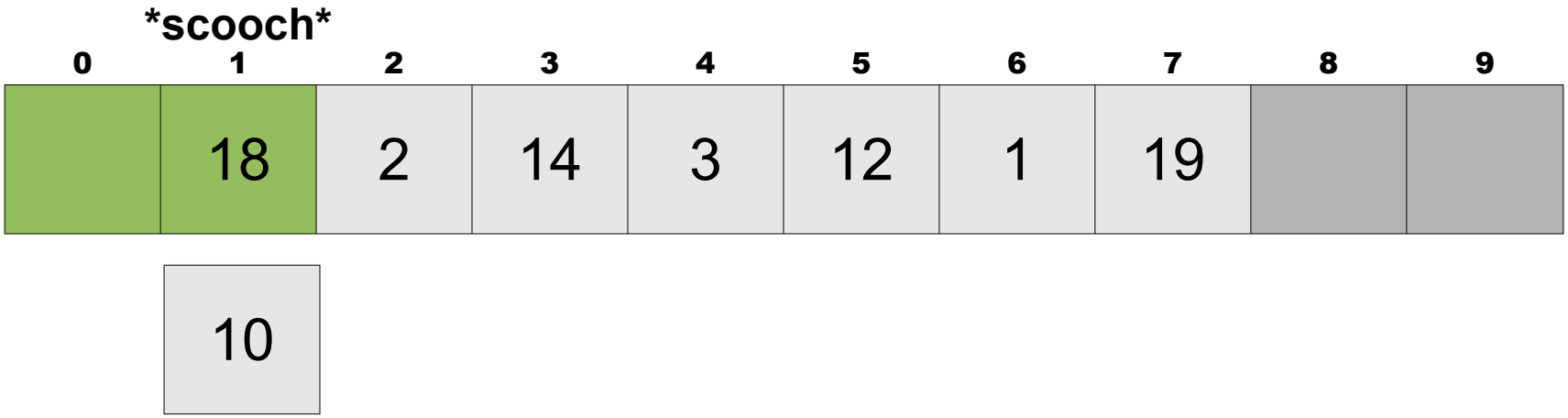

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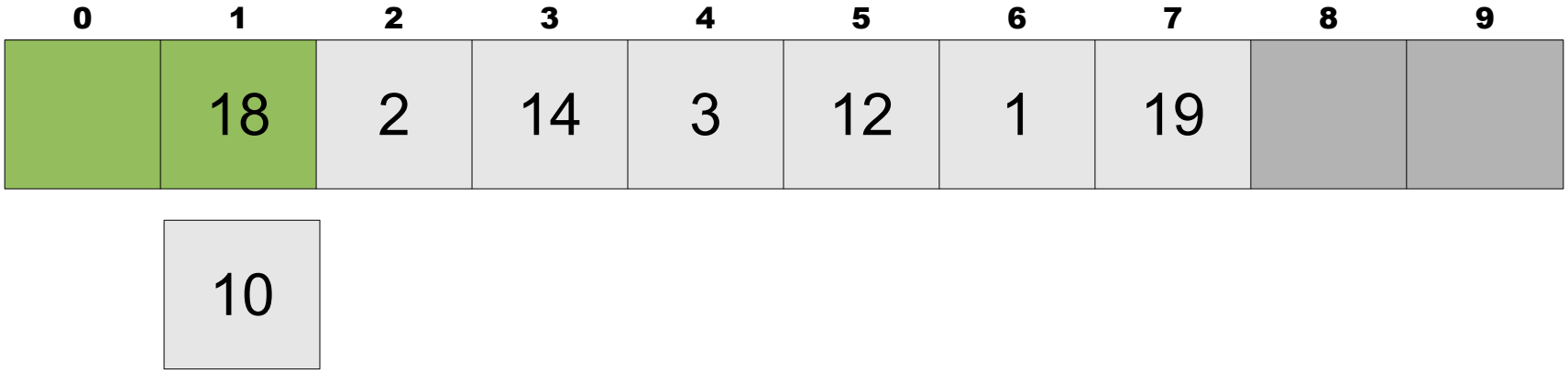

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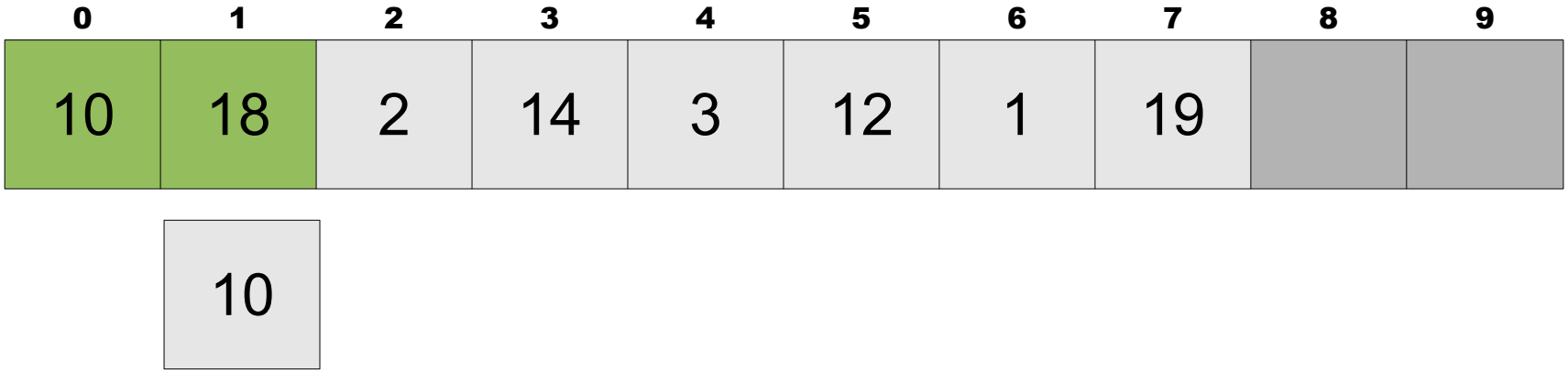

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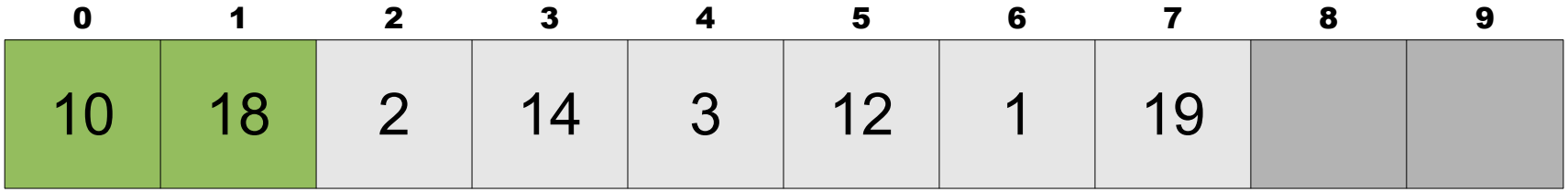

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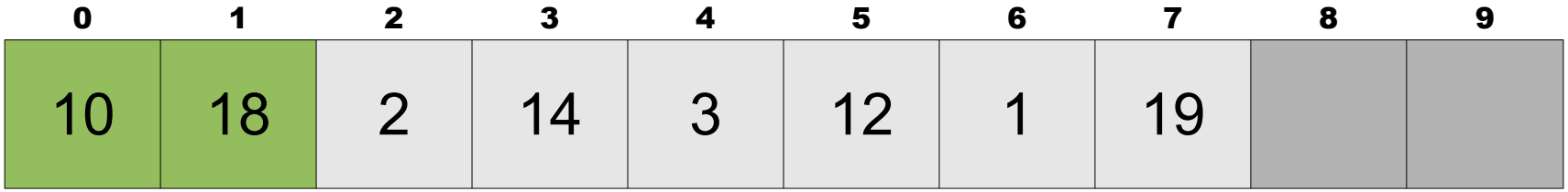
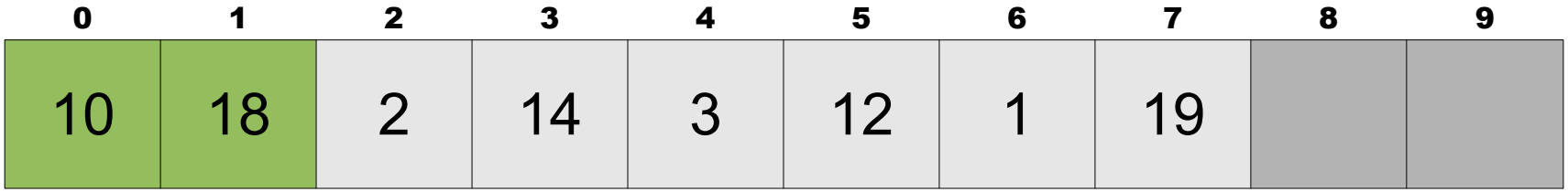


That was easy!

Let’s see if we can do it again.

Insertion Sort

(insert each element into a sorted partition)



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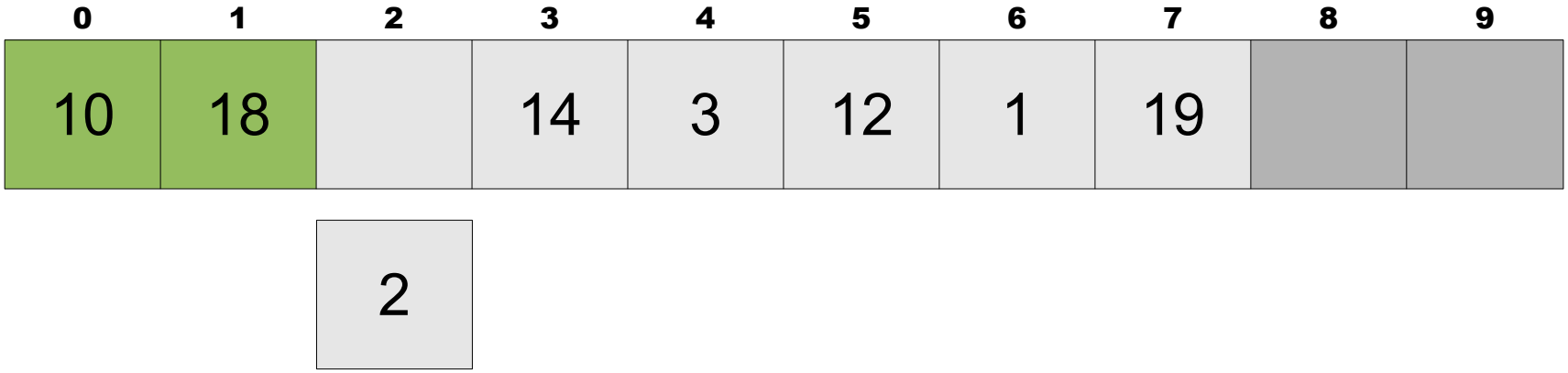

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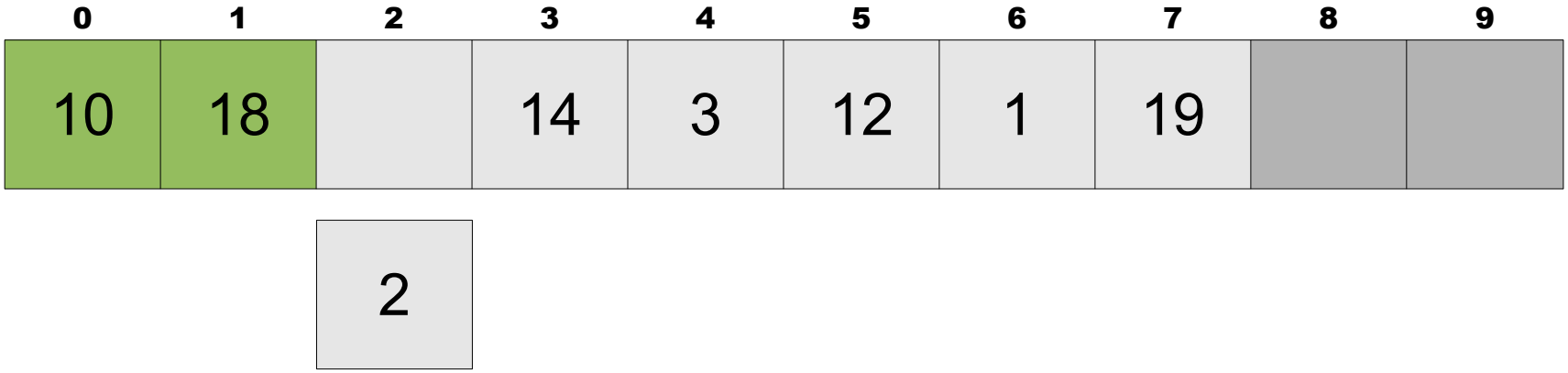
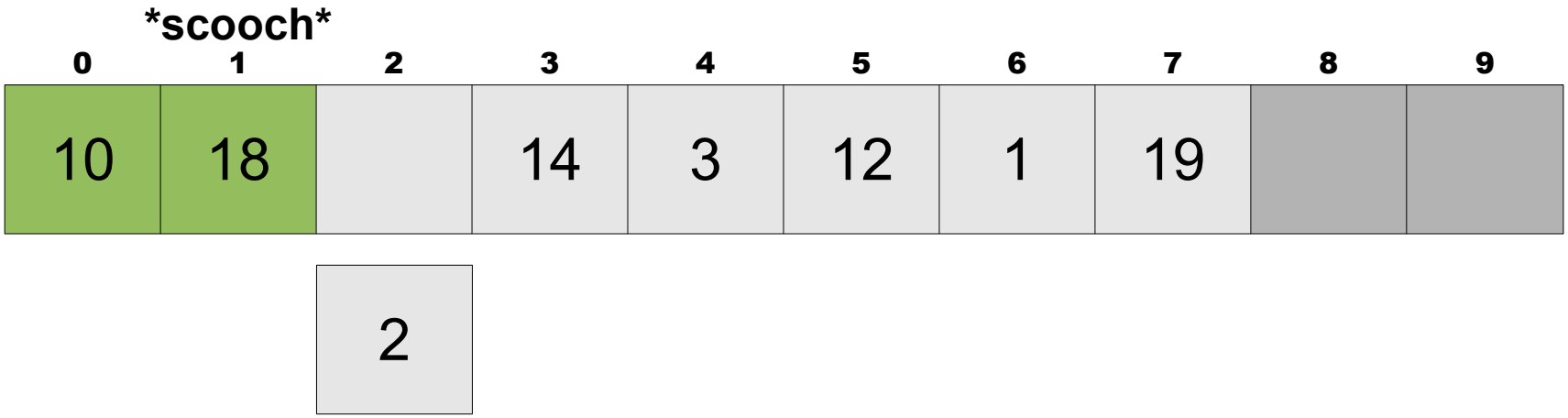


Pull the first element out of the **unsorted** partition of the vector.

Start **scooching** things over if they're greater than 2.

Insertion Sort

(insert each element into a sorted partition)



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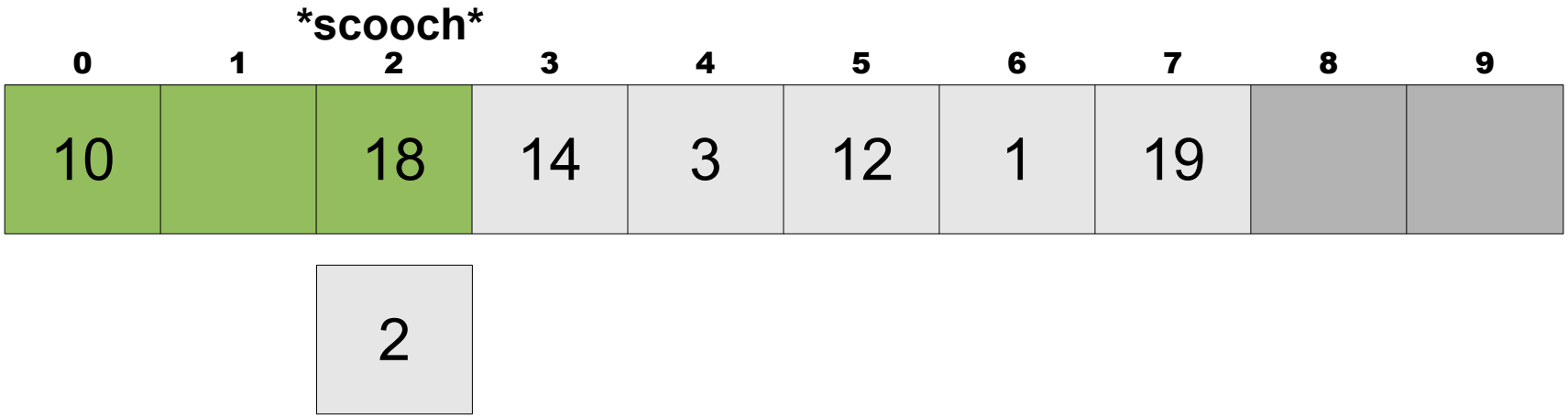

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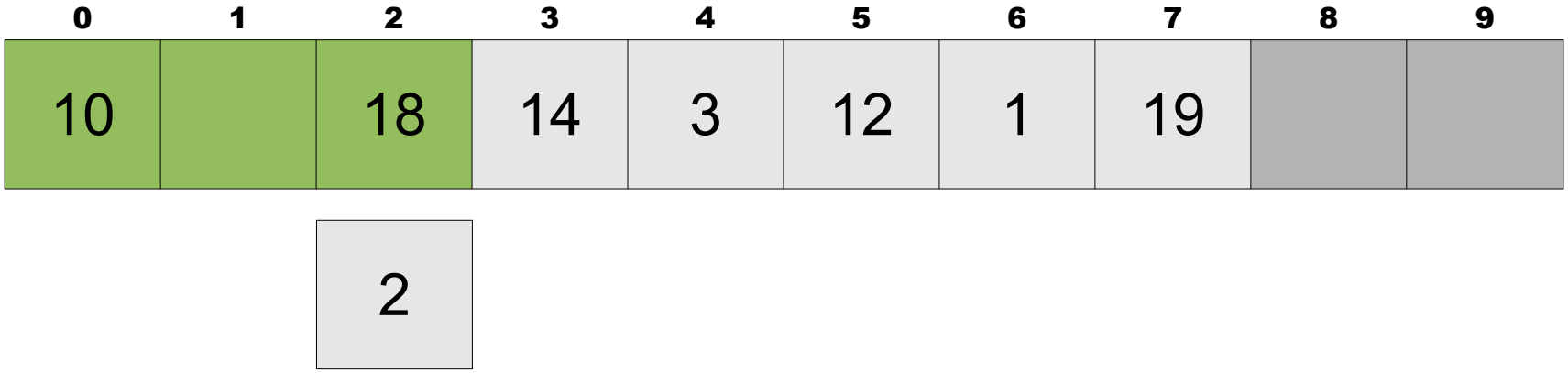

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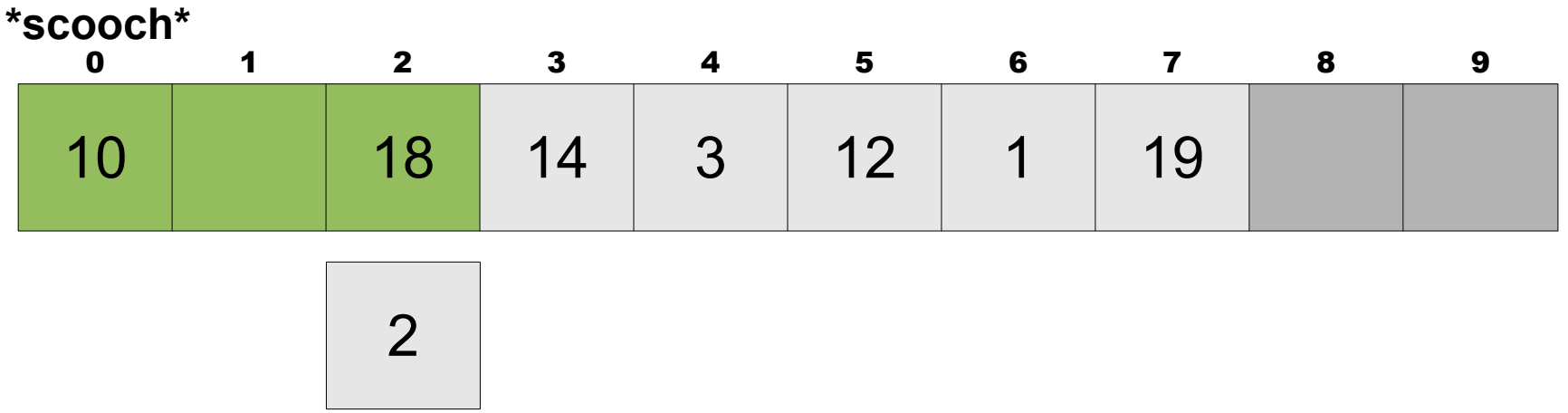

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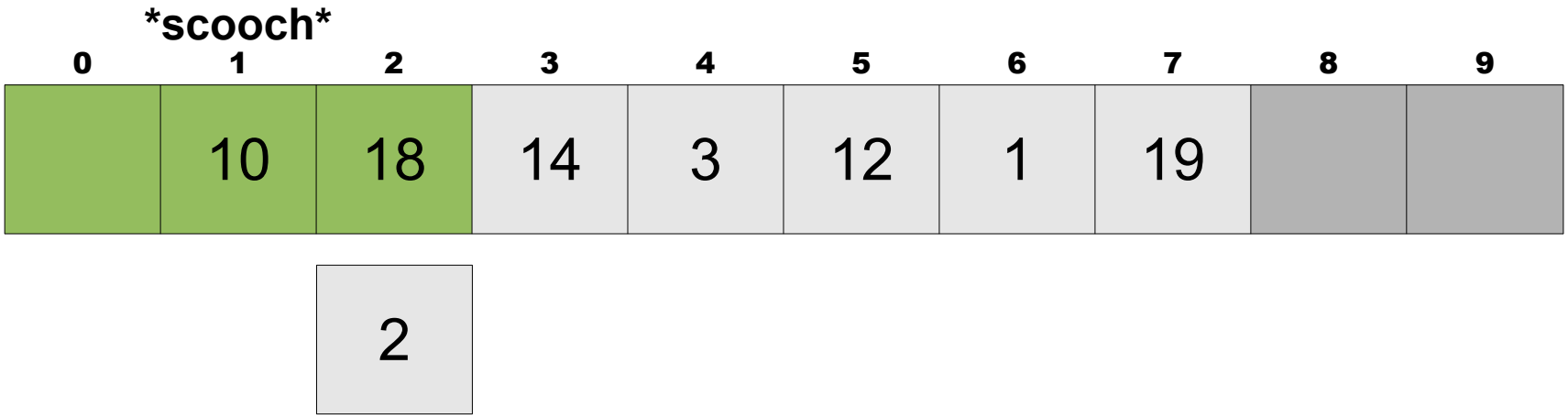

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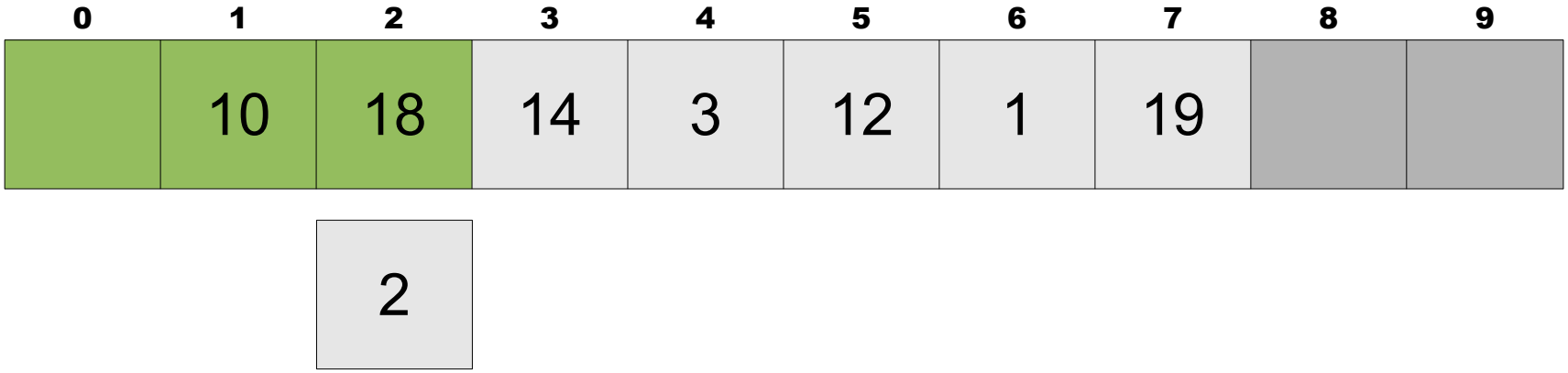

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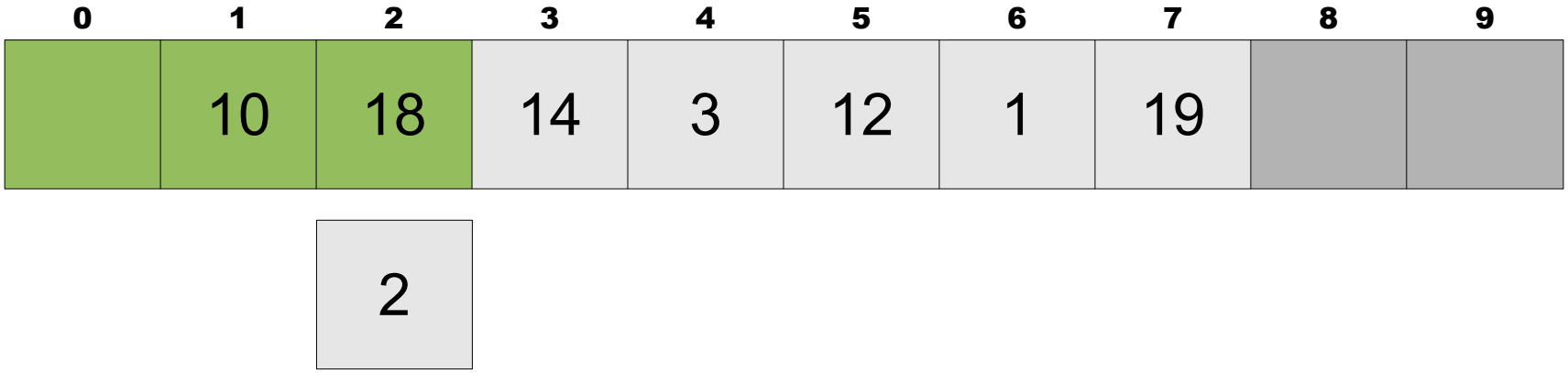

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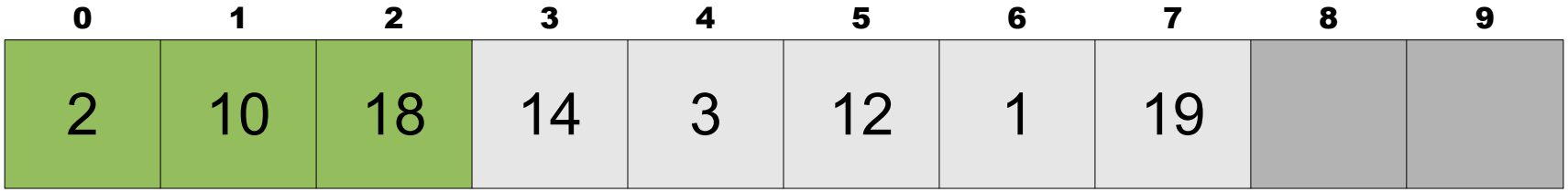

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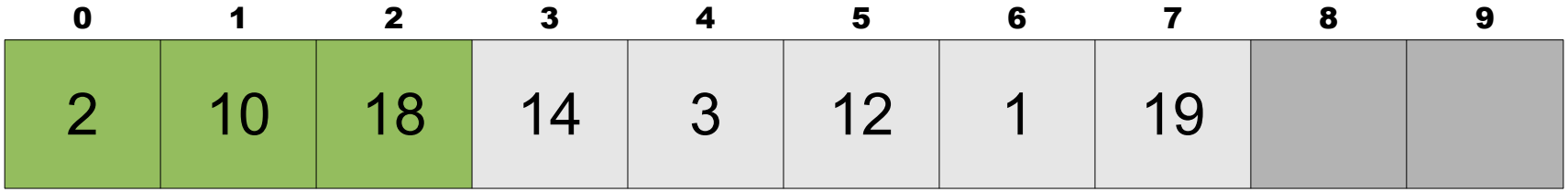

TADA!

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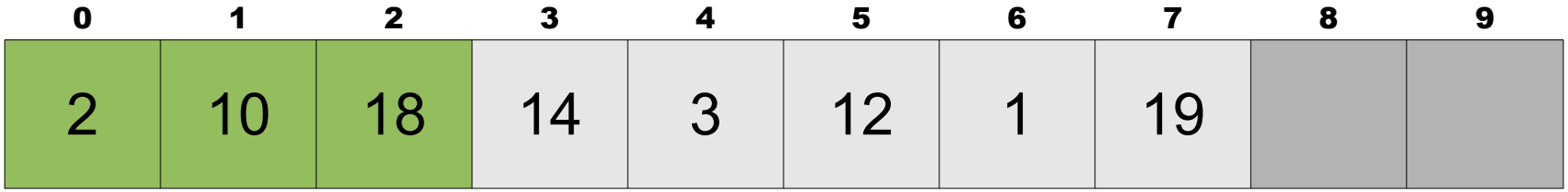

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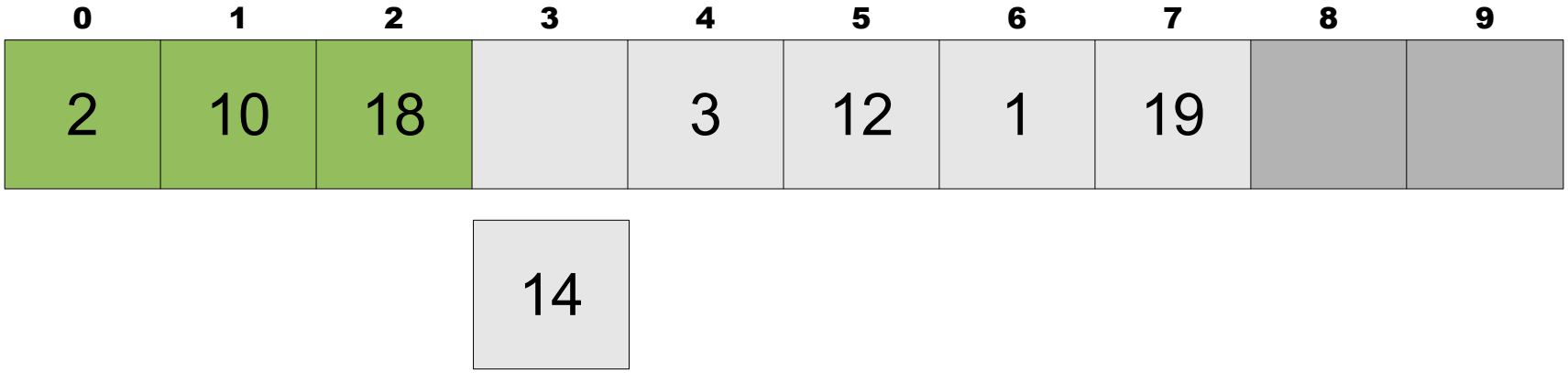

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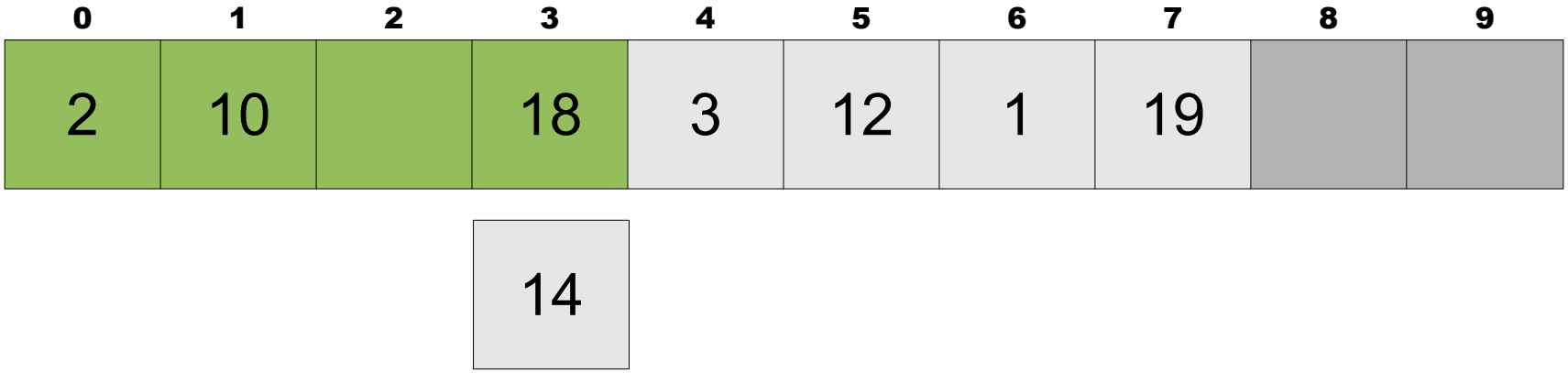

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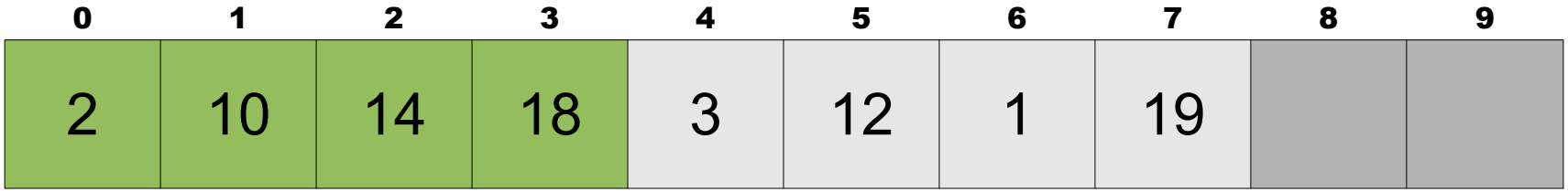

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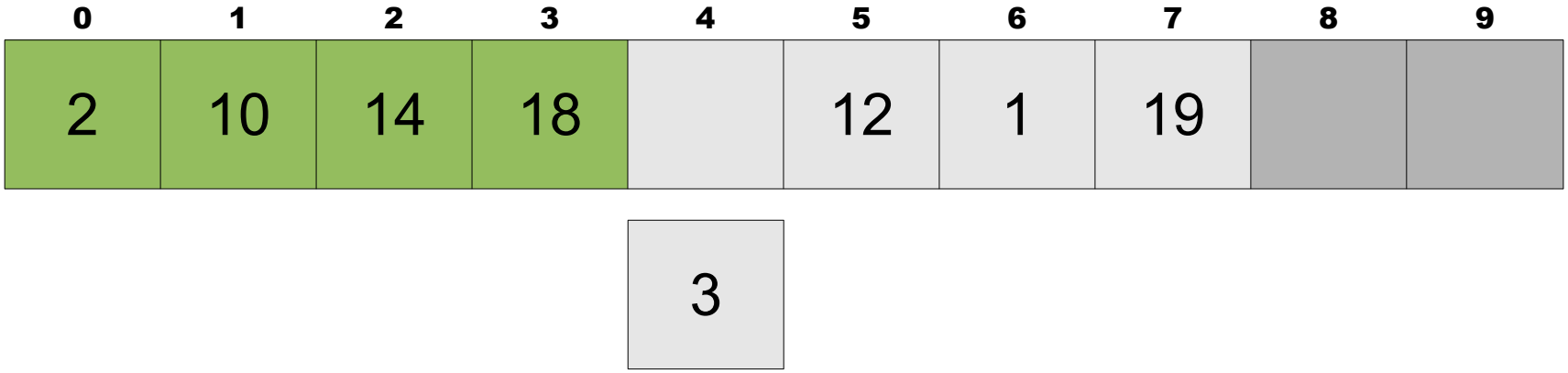

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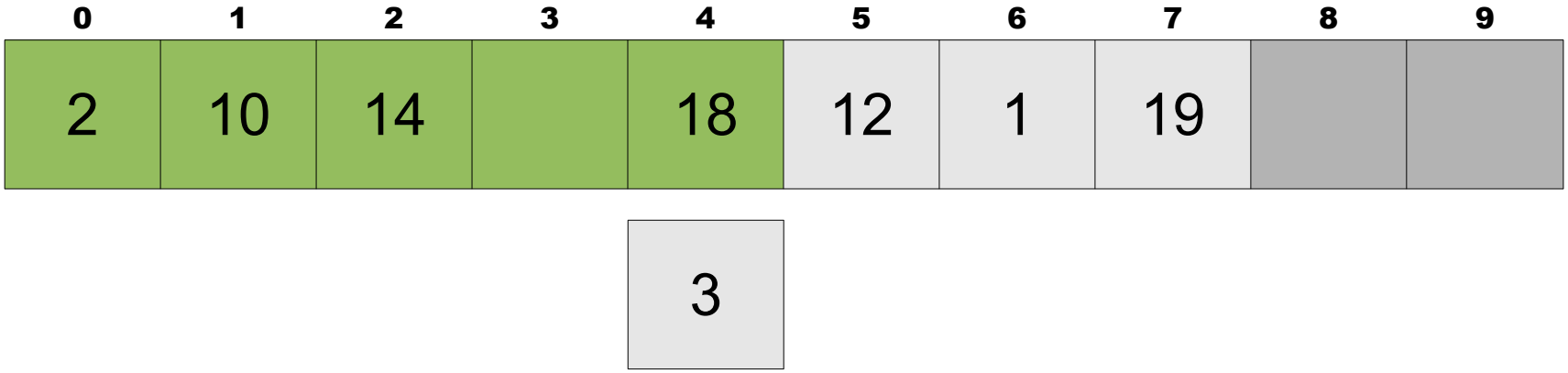

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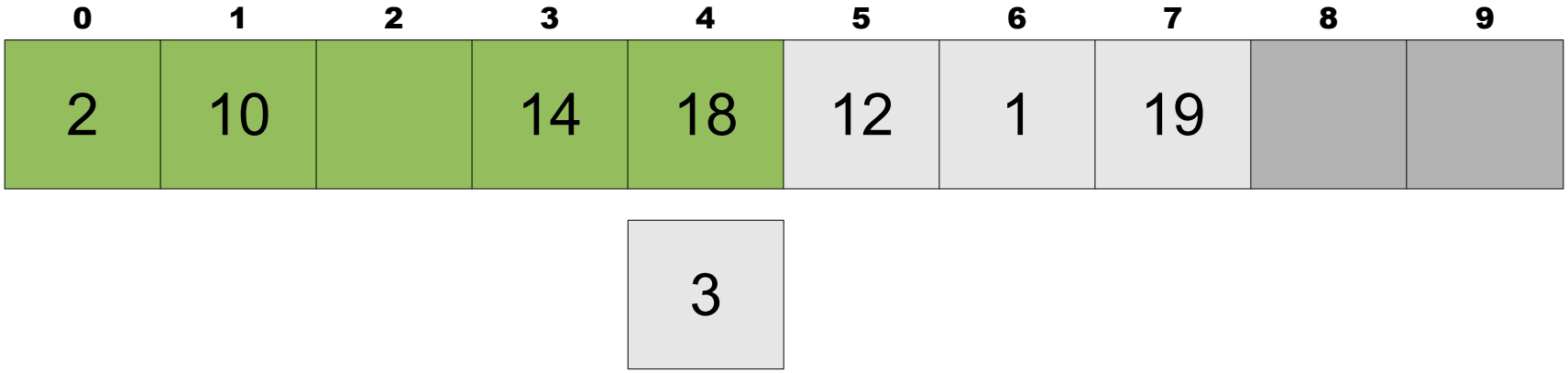

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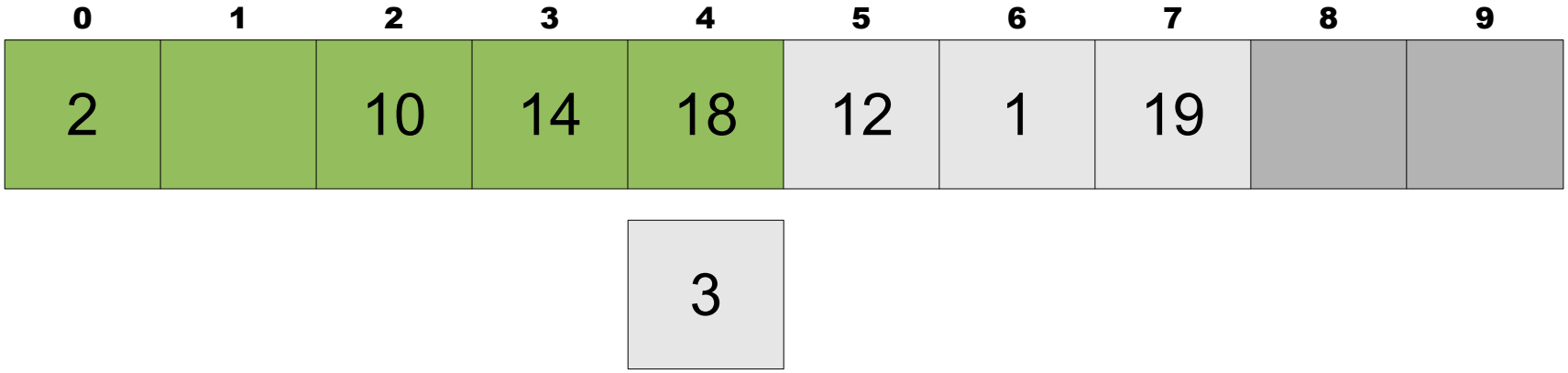

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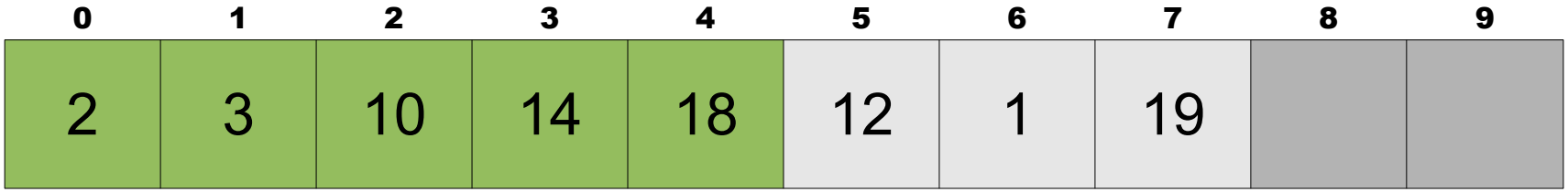

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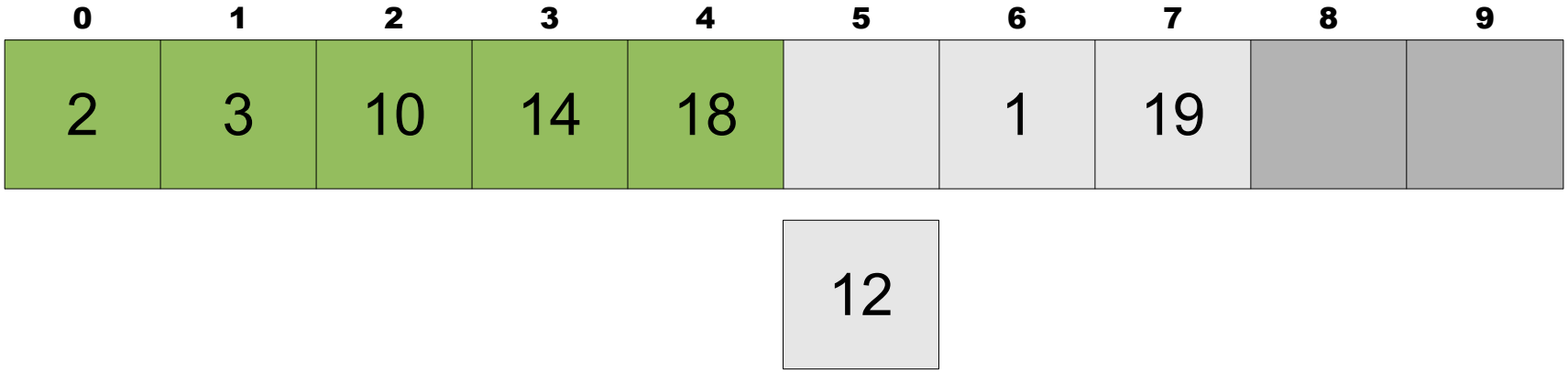

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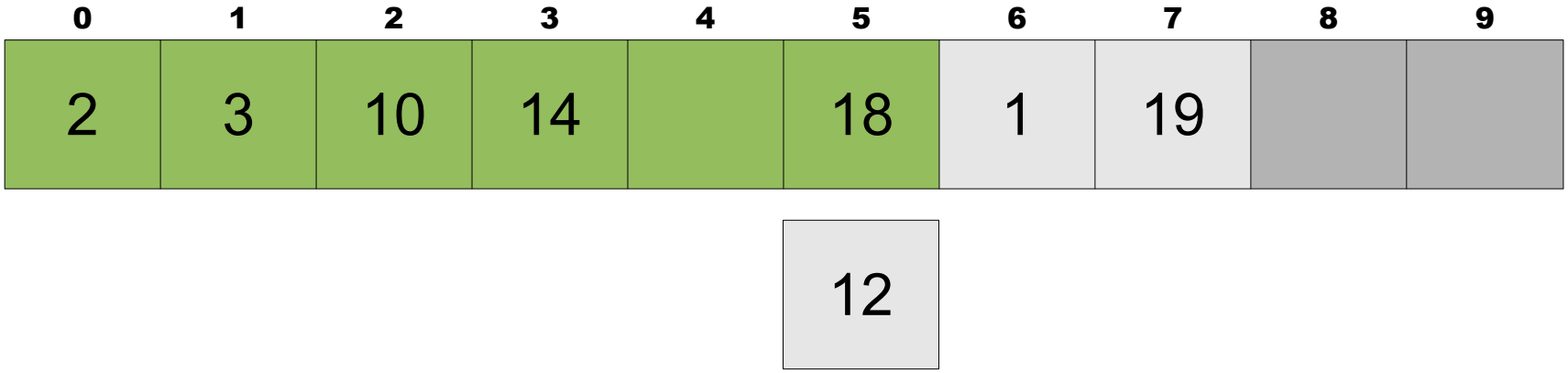

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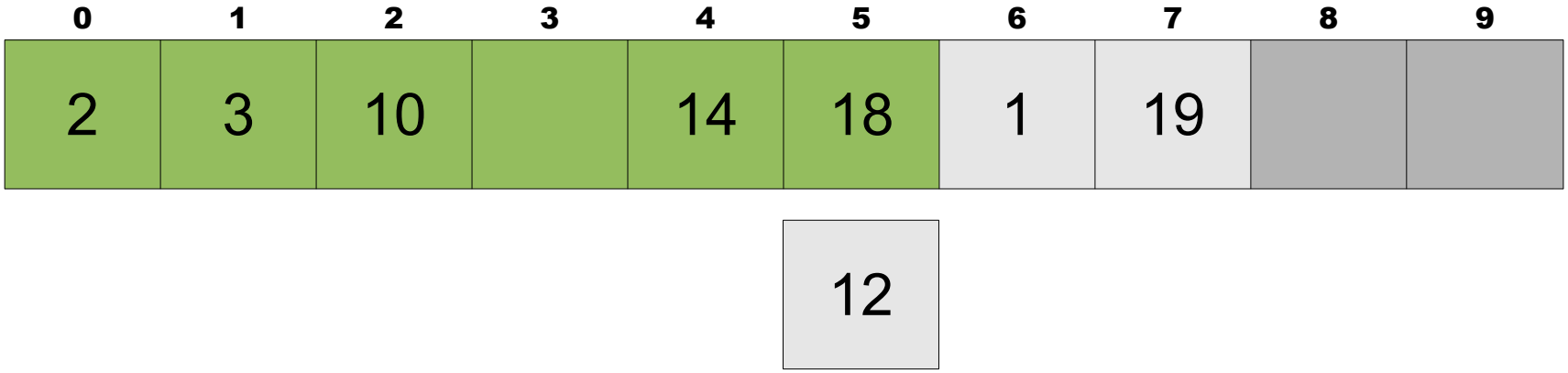

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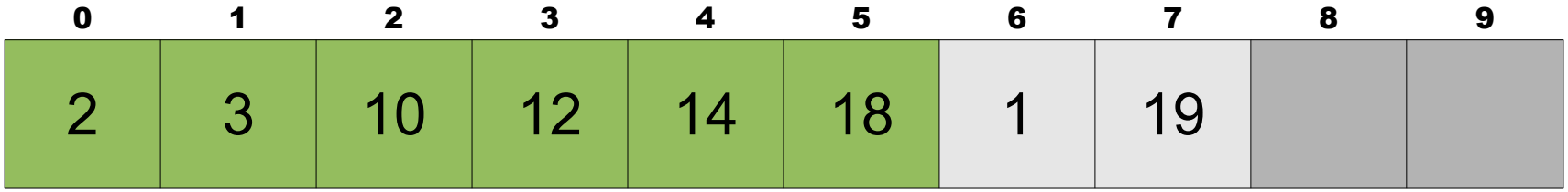

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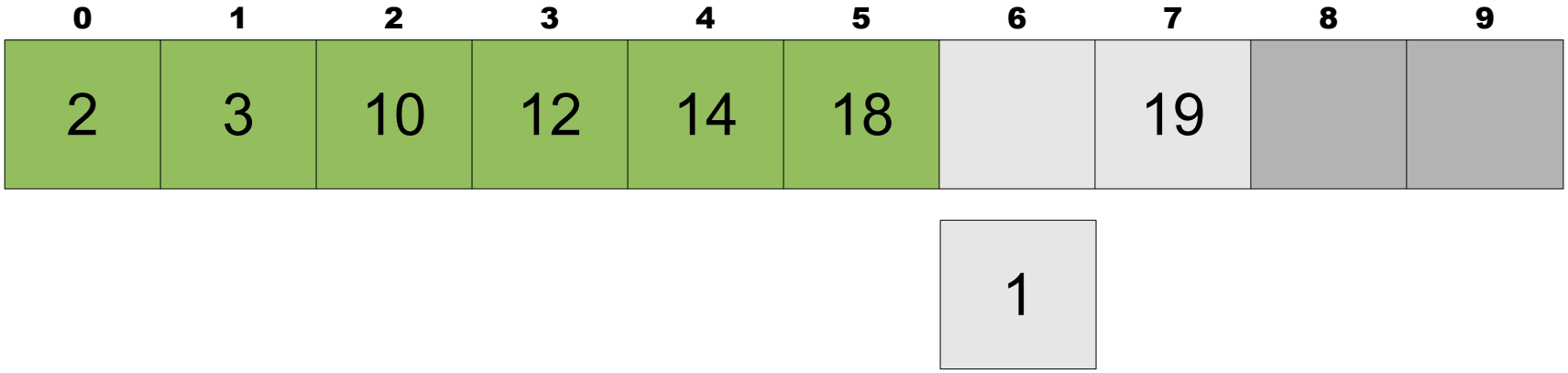

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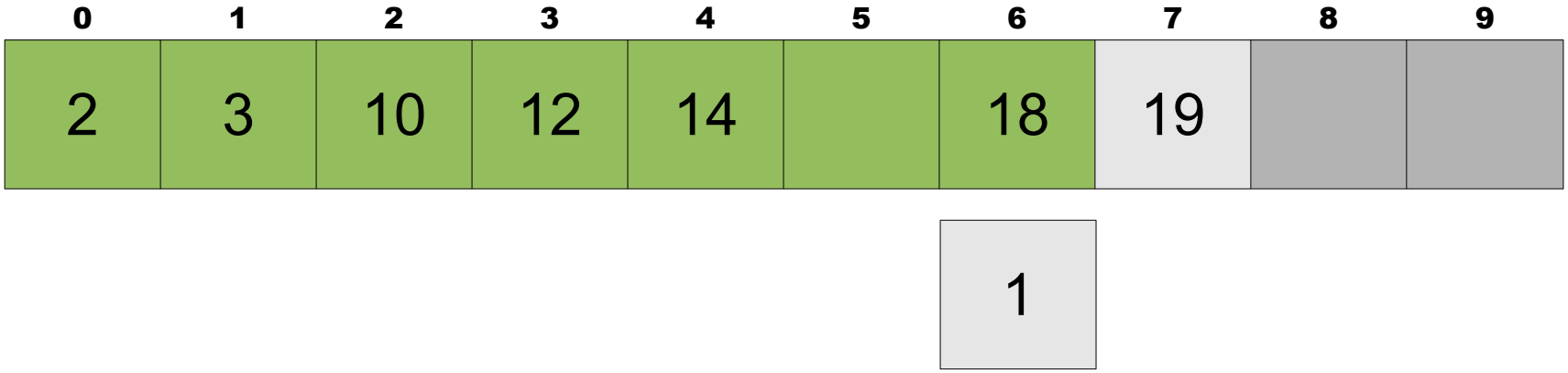

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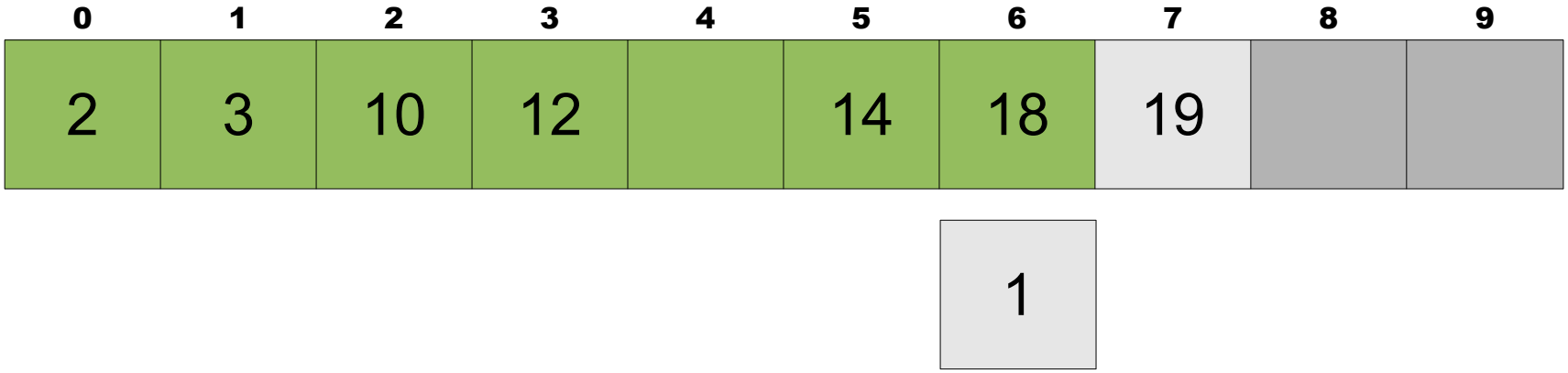

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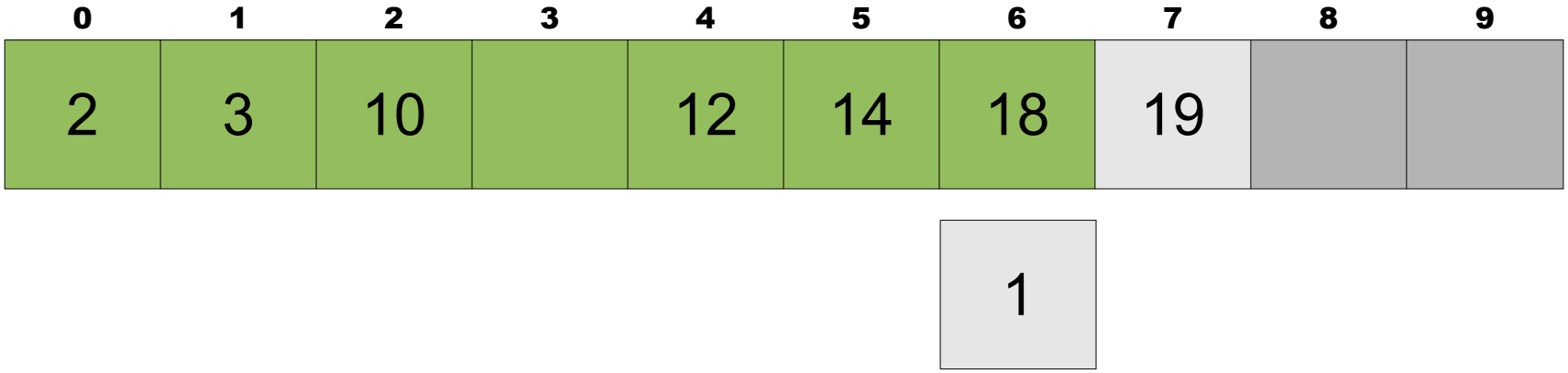

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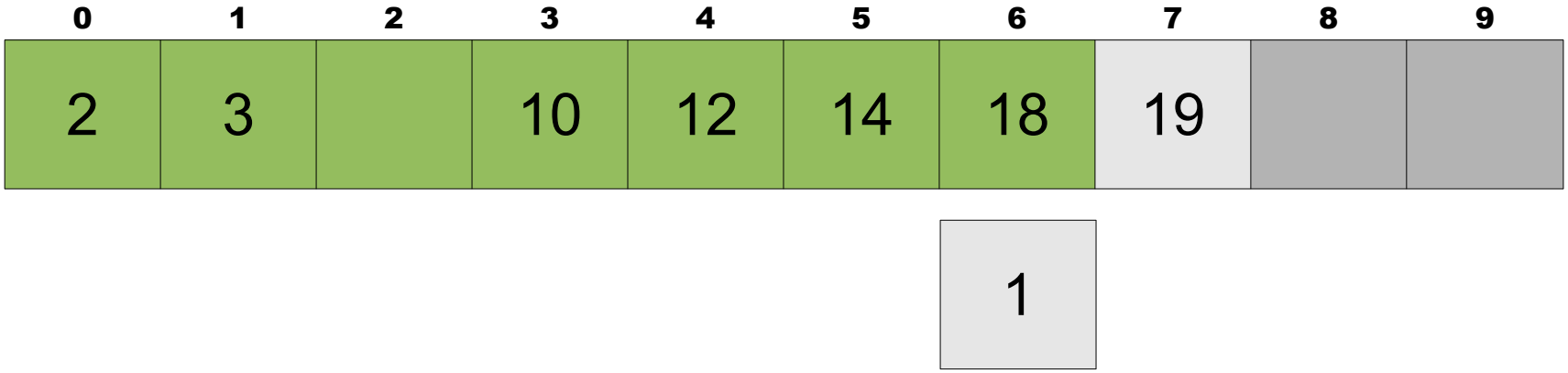

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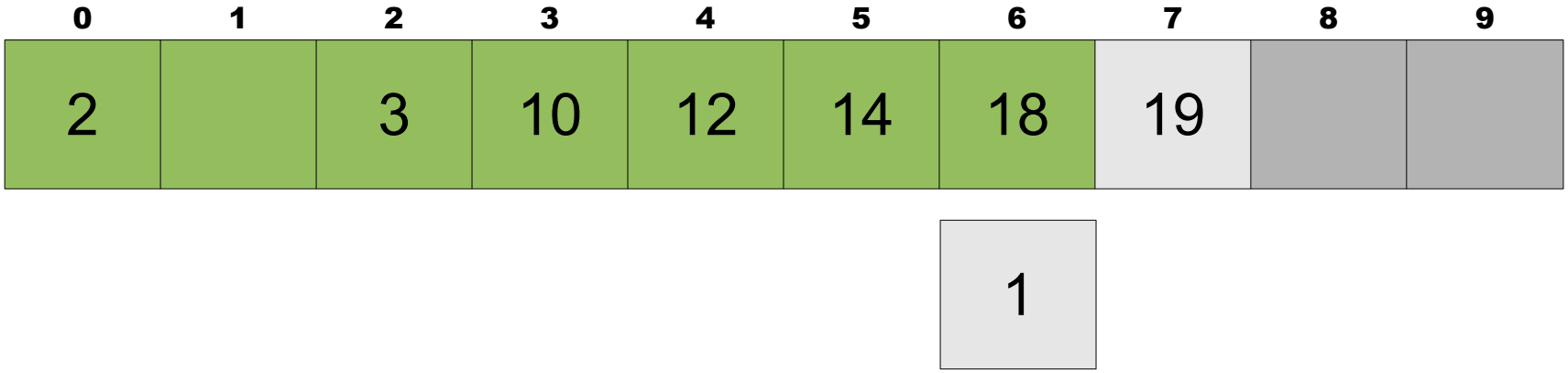

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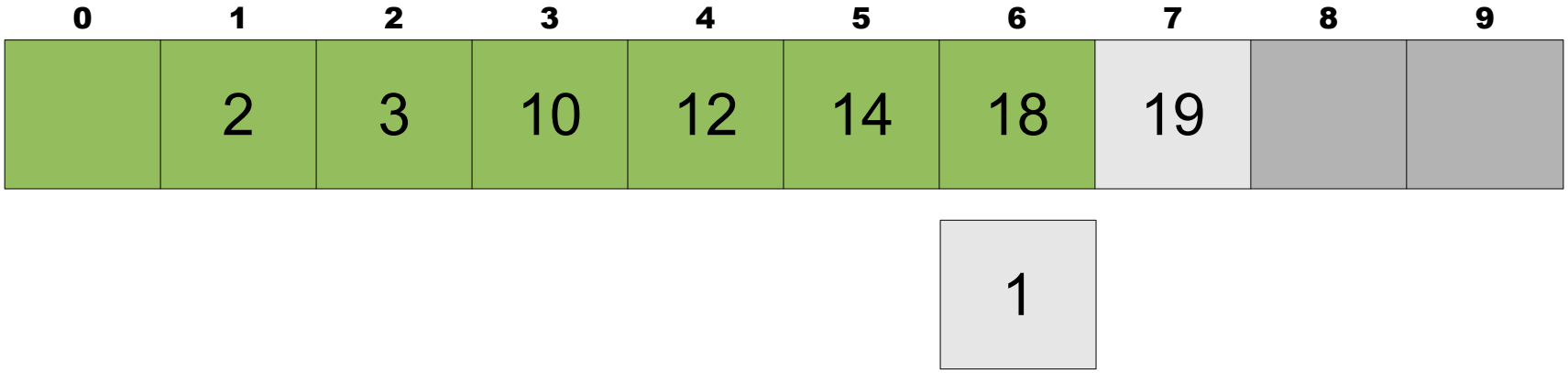

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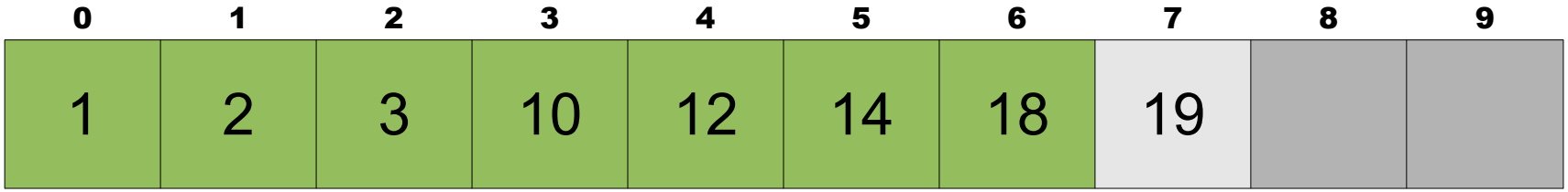
Insertion Sort

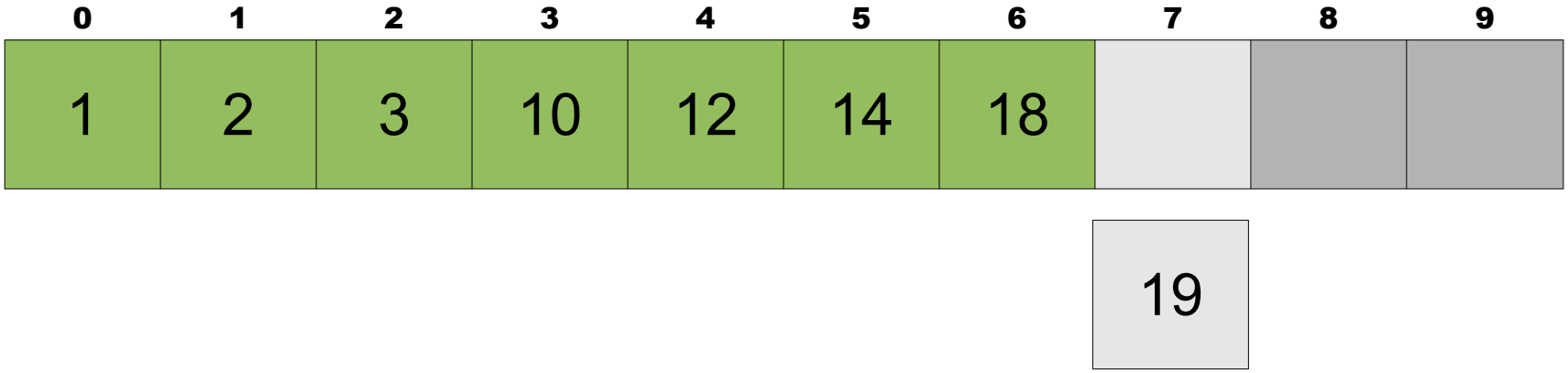
(insert each element into a sorted partition)



See if you can follow along...

Insertion Sort

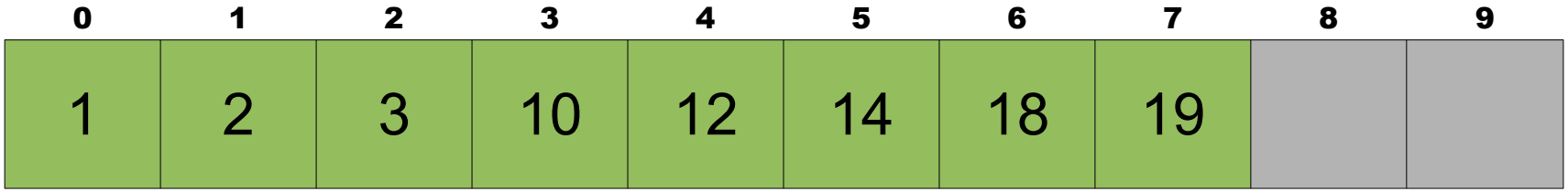
(insert each element into a sorted partition)



See if you can follow along...

Insertion Sort

(insert each element into a sorted partition)



We're finished!

(Hooray!)

Insertion Sort

(insert each element into a sorted partition)

0	1	2	3	4	5	6	7	8	9
1	2	3	10	12	14	18	19		

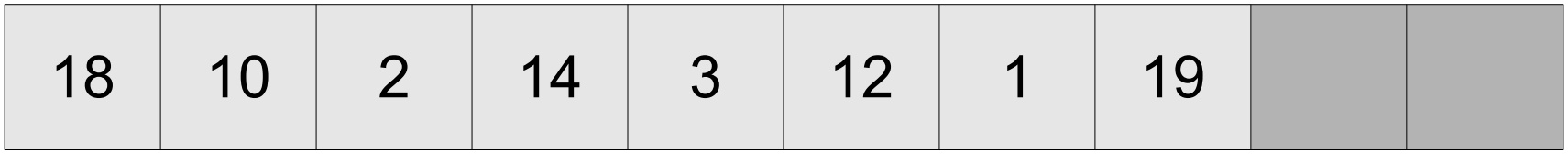
1. What's the **worst-case** Big-Oh runtime?

2. What's the **best-case** Big-Oh runtime?

3. Show the vector after **each pass** of Insertion Sort.

Insertion Sort

(let's code it up)




```
void insertionSort(Vector<int>& v)
{
   for (int i = 1; i < v.size(); i++)
   {
      int val = v[i];
      int gap = i;

      for (int j = gap - 1; j >= 0 && v[j] > val; j--)
      {
         v[j + 1] = v[j];
         gap--;
      }

      v[gap] = val;
   }
}
```