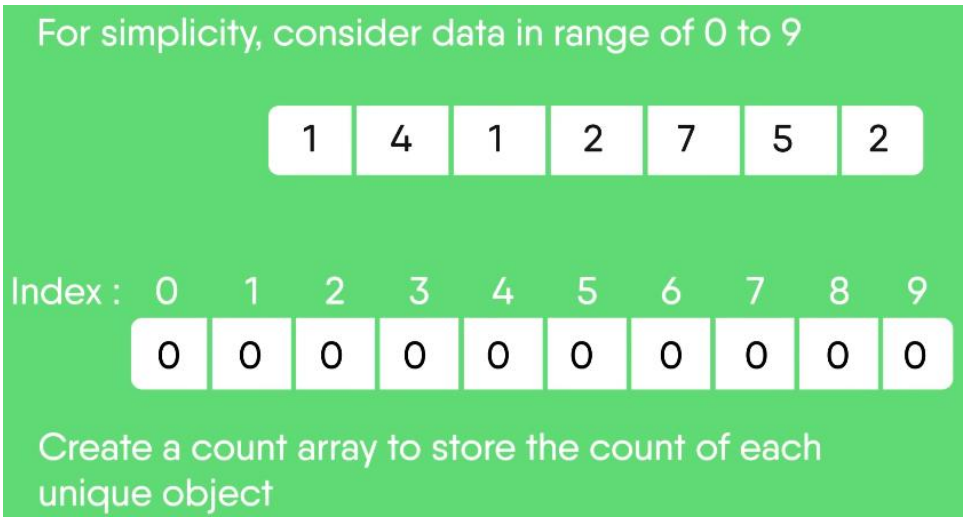
Counting Sort Algorithm:

Counting sort is a sorting technique based on keys between a specific range.

It works by counting the number of objects having distinct key values.
Then doing some arithmetic to calculate
the position of each object in the output sequence.



… initially, the count of all the elements is zero.

First, count each element in the given array and place the count at the appropriate index:

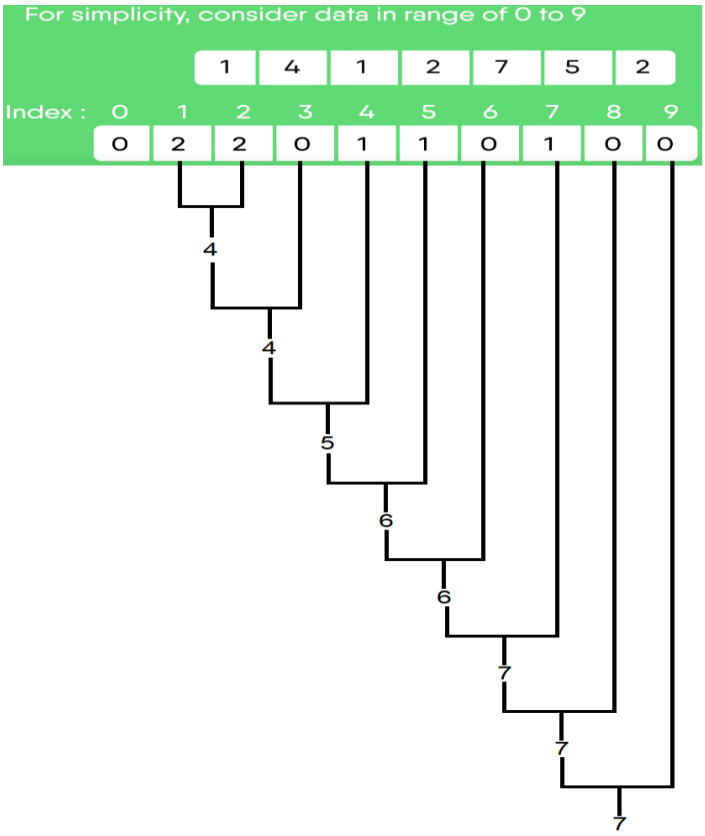

For simplicity, consider data in range of 0 to 9
1 4 1 2 7 5 2
Index : 0 1 2 3 4 5 6 7 8 9
0 2 1 0 1 0 0 0 0 0

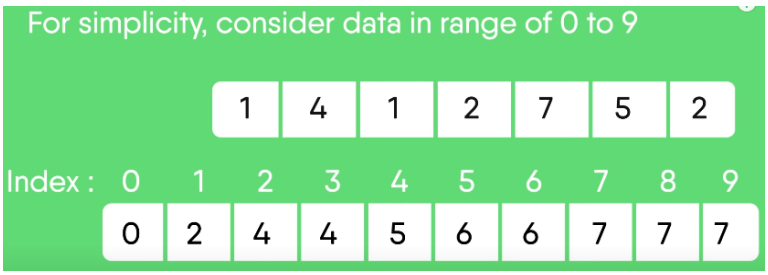

For simplicity, consider data in range of 0 to 9
1 4 1 2 7 5 2
Index : 0 1 2 3 4 5 6 7 8 9
0 2 1 0 1 0 0 1 0 0


For simplicity, consider data in range of 0 to 9
1 4 1 2 7 5 2
Index : 0 1 2 3 4 5 6 7 8 9
0 2 1 0 1 1 0 1 0 0

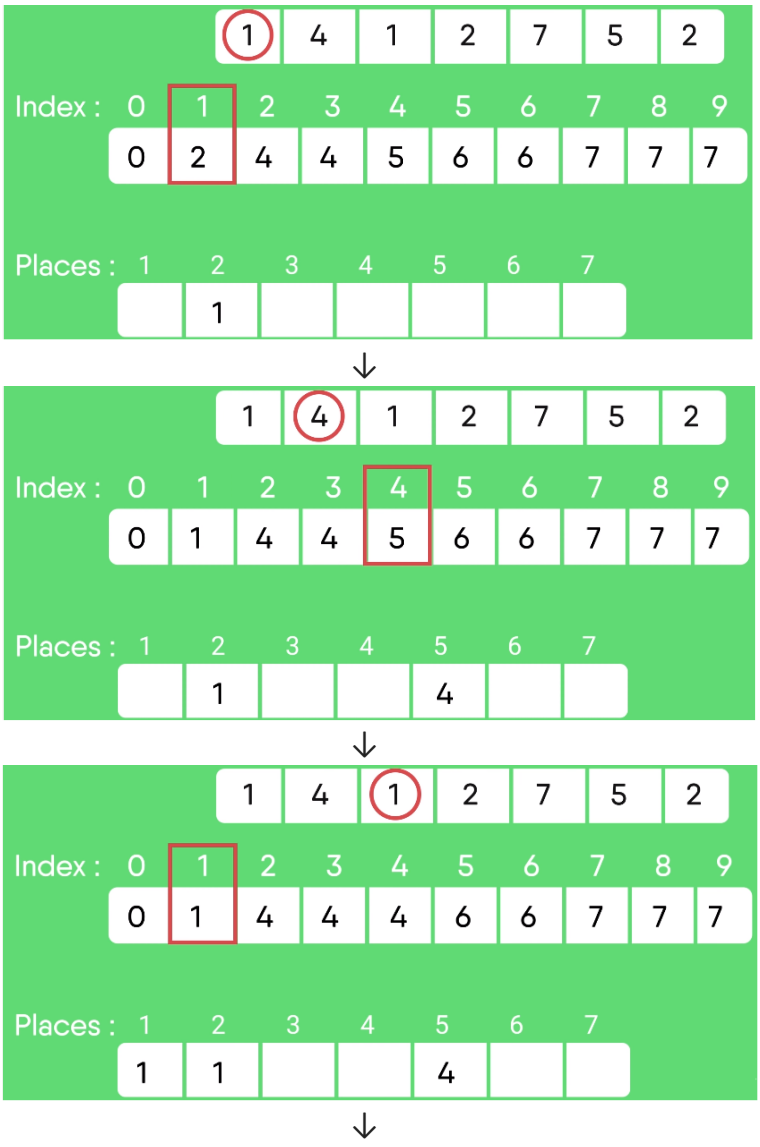

For simplicity, consider data in range of 0 to 9
1 4 1 2 7 5 2
Index : 0 1 2 3 4 5 6 7 8 9
0 2 2 0 1 1 0 1 0 0

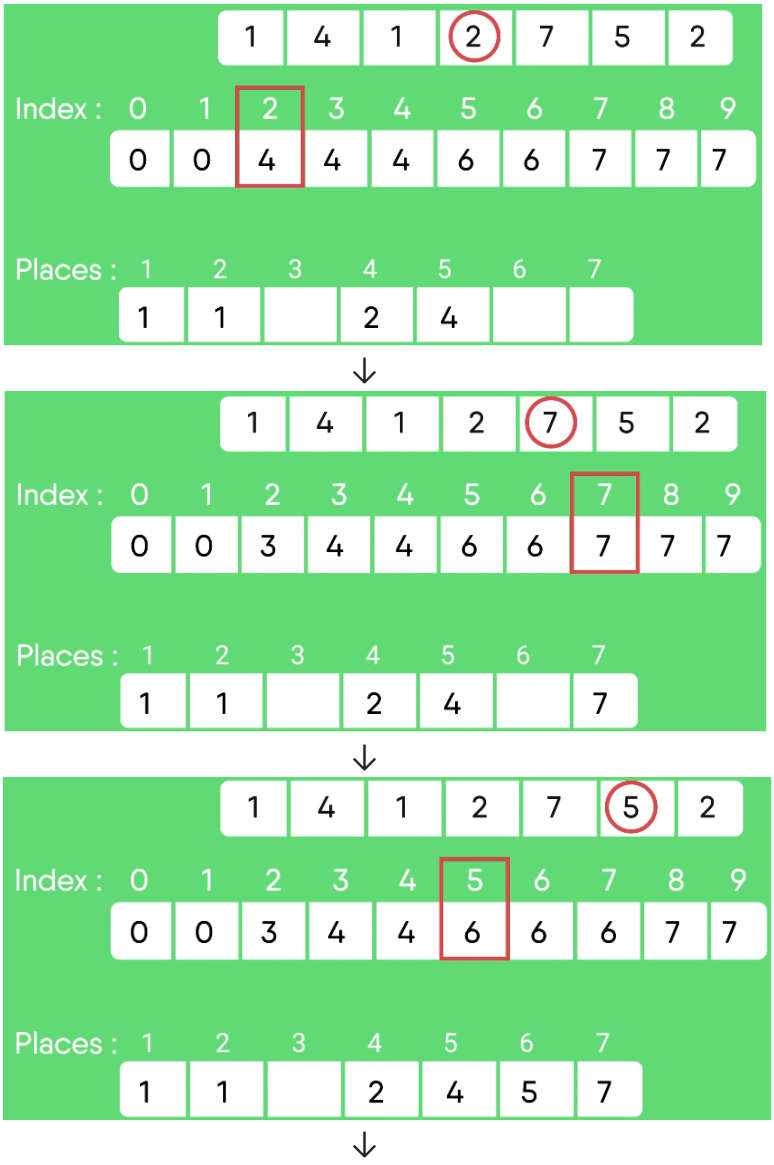
Now we modify the count array by adding the previous counts:

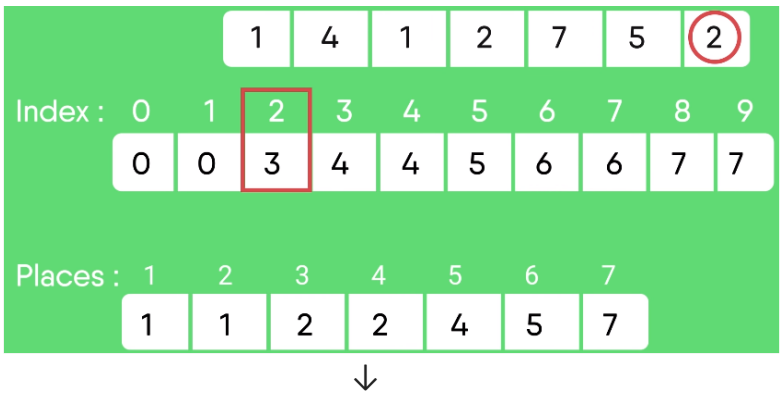




Now, we place the objects in their correct positions and decrease the count by one:




1 4 1 2 7 5 2
Index : 0 1 2 3 4 5 6 7 8 9
0 0 4 4 4 6 6 7 7 7
Places : 1 2 3 4 5 6 7
1 1 2 4
1 4 1 2 7 5 2
Index : 0 1 2 3 4 5 6 7 8 9
0 0 3 4 4 6 6 7 7 7
Places : 1 2 3 4 5 6 7
1 1 2 4 7
1 4 1 2 7 5 2
Index : 0 1 2 3 4 5 6 7 8 9
0 0 3 4 4 6 6 6 7 7
Places : 1 2 3 4 5 6 7
1 1 2 4 5 7



… and remember the counts are decreased by one: