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FACULTY OF ENGINEERING & TECHNOLOGY

Lecture : 08

Mr. Nilesh

Assistant Professor

Computer Science & Engineering

❑ Outline

- Merge sort

Divide and Conquer

- Divide and Conquer cuts the problem in half each time, but uses the result of both halves:
  - cut the problem in half until the problem is trivial
  - solve for both halves
  - combine the solutions

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Merge sort

- A divide-and-conquer algorithm:
- Divide the unsorted array into 2 halves until the sub-arrays only contain one element
- Merge the sub-problem solutions together:
  - Compare the sub-array's first elements
  - Remove the smallest element and put it into the result array
  - Continue the process until all elements have been put into the result array

37	23	6	89	15	12	2	19

Algorithm

```
Mergesort(Passed an array)
  if array size > 1
       Divide array in half
       Call Mergesort on first half.
       Call Mergesort on second half.
       Merge two halves.

Merge(Passed two arrays)
  Compare leading element in each array
  Select lower and place in new array.
    (If one input array is empty then place
     remainder of other array in output array)
```

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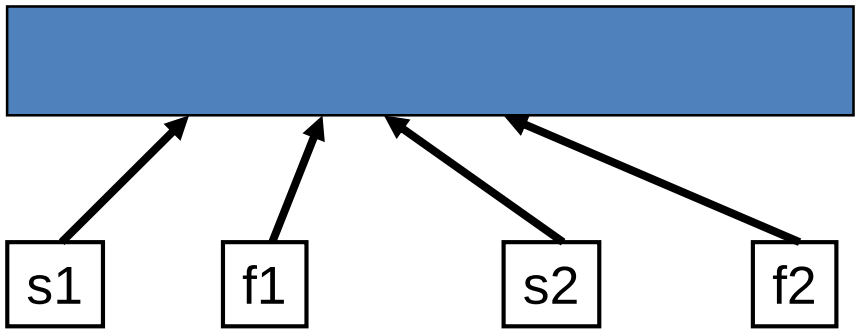
More TRUTH in CS

- We don’t really pass in two arrays!
- We pass in one array with indicator variables which tell us where one set of data starts and finishes and where the other set of data starts and finishes.
- Honest.



Algorithm

Mergesort(Passed an array)
  if array size > 1
      Divide array in half
      Call Mergesort on first half.
      Call Mergesort on second half.
      Merge two halves.

Merge (Passed two arrays)
  Compare leading element in each array
  Select lower and place in new array.
    (If one input array is empty then place
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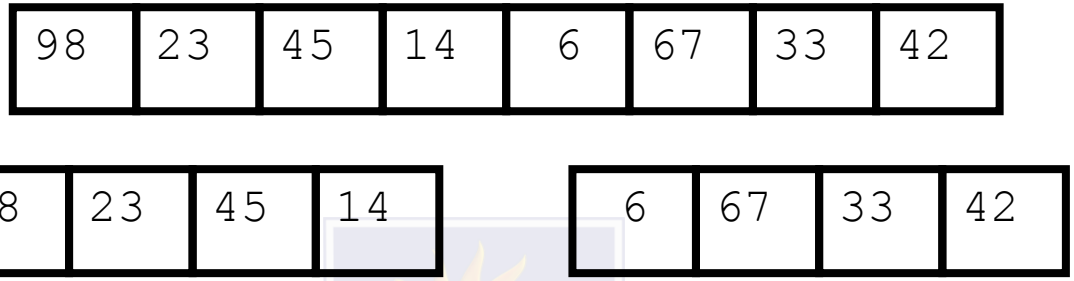

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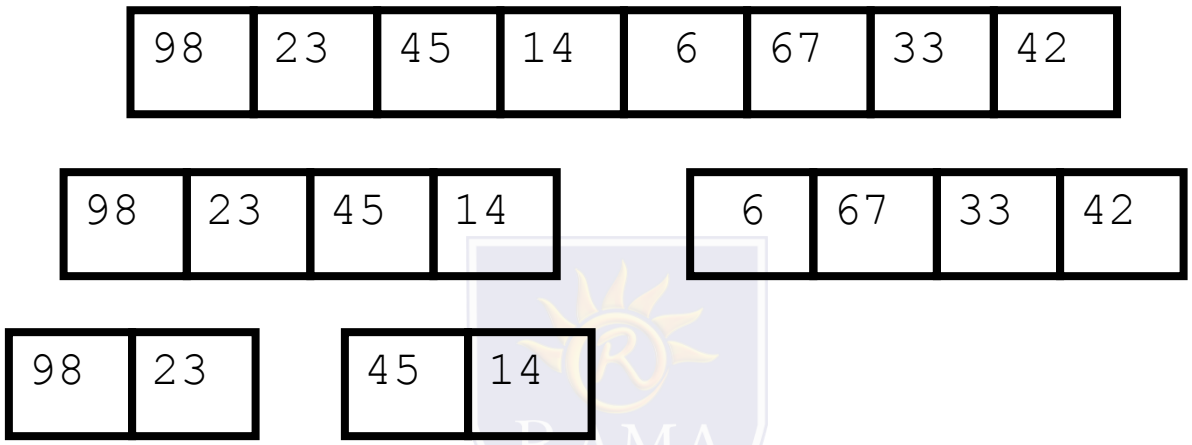
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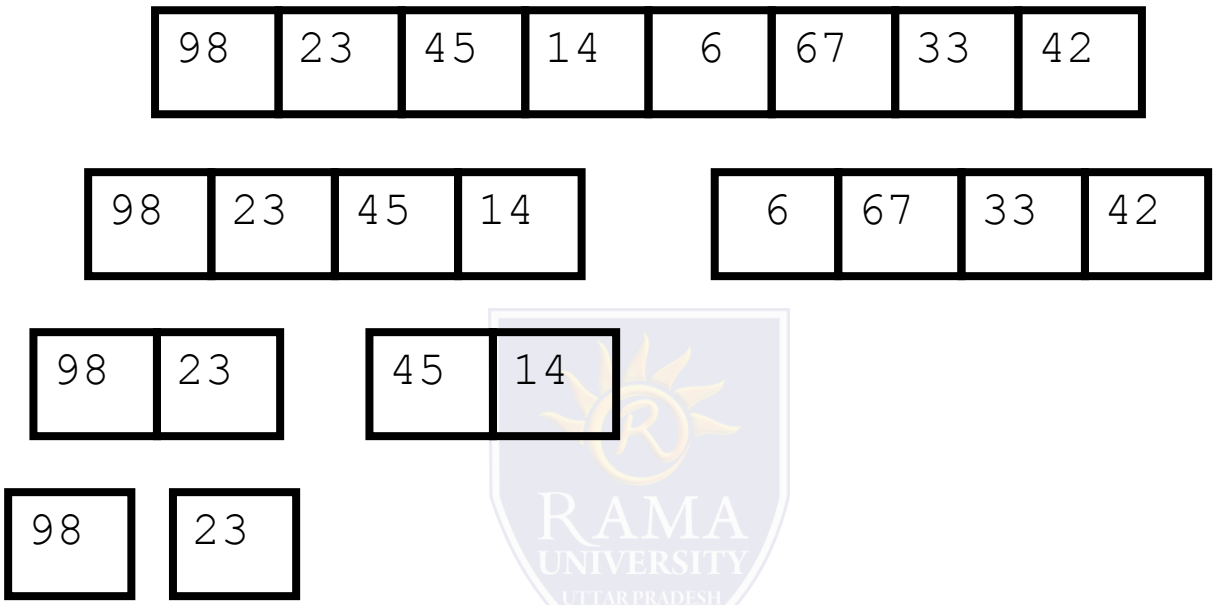
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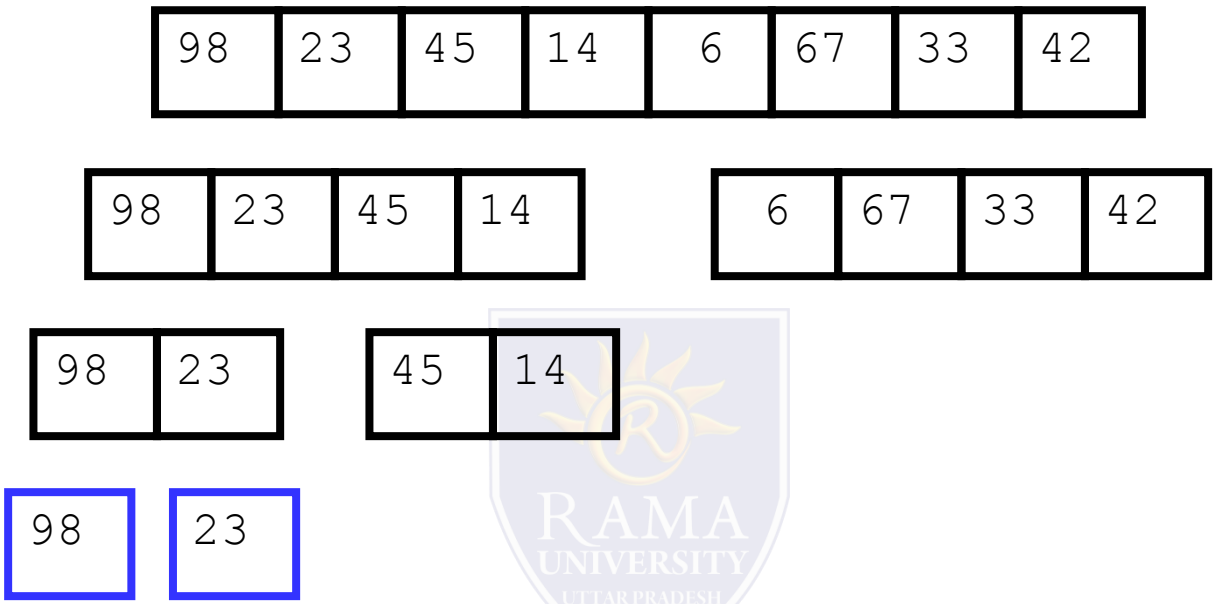
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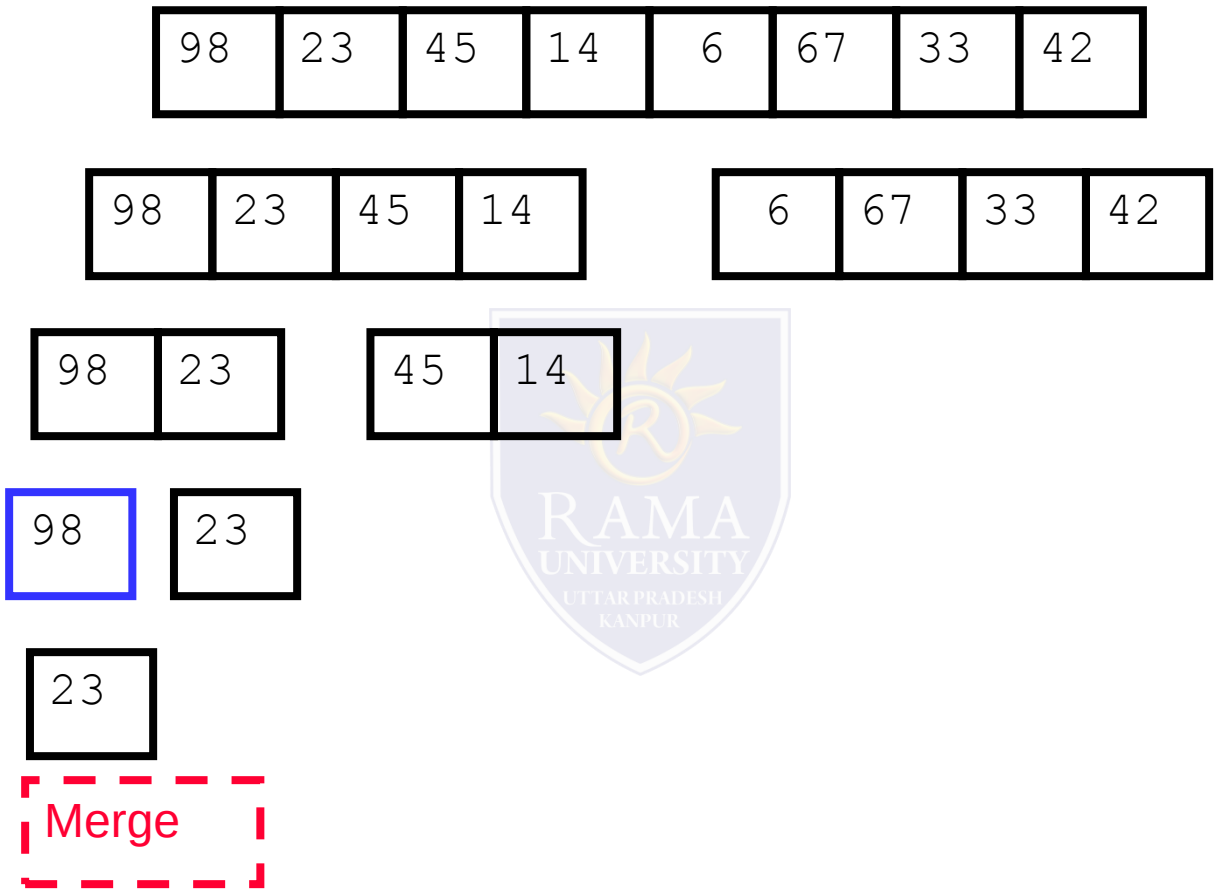
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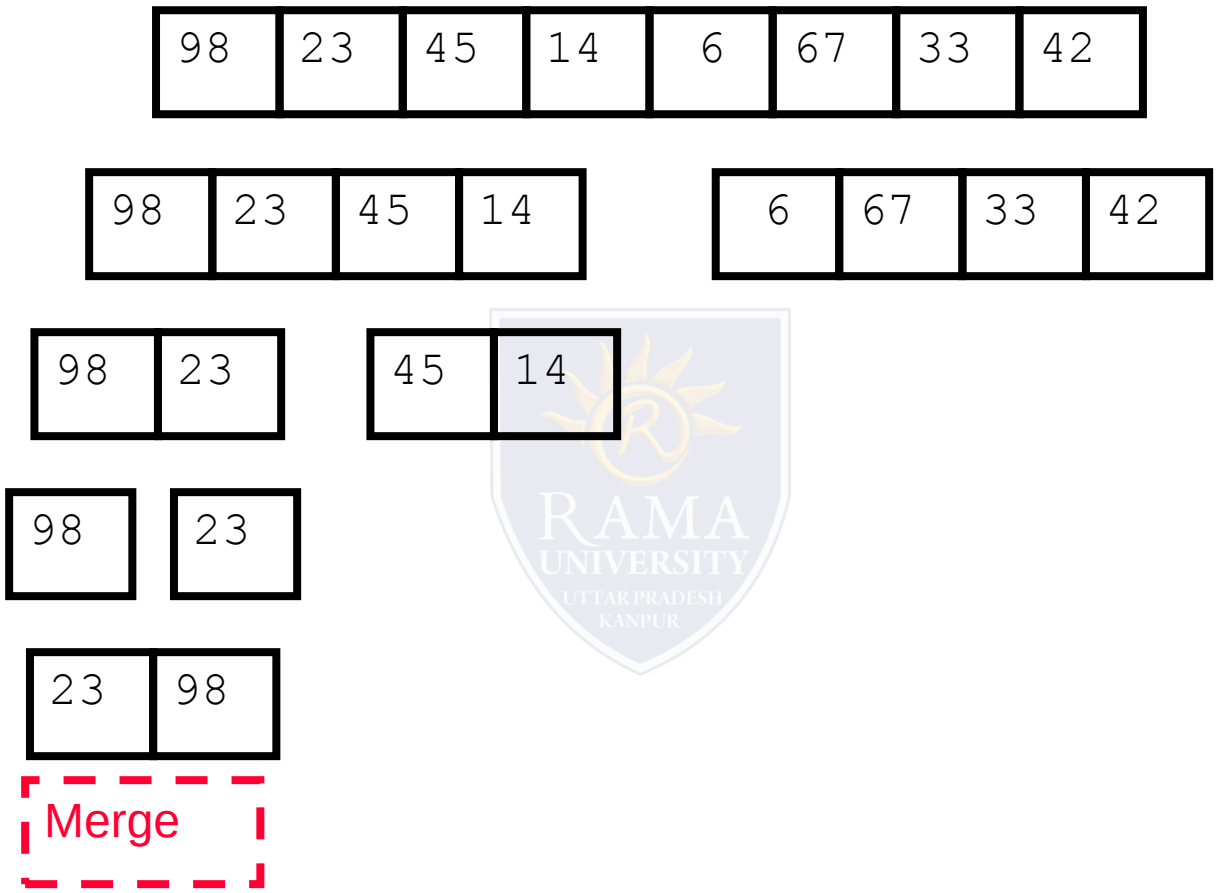
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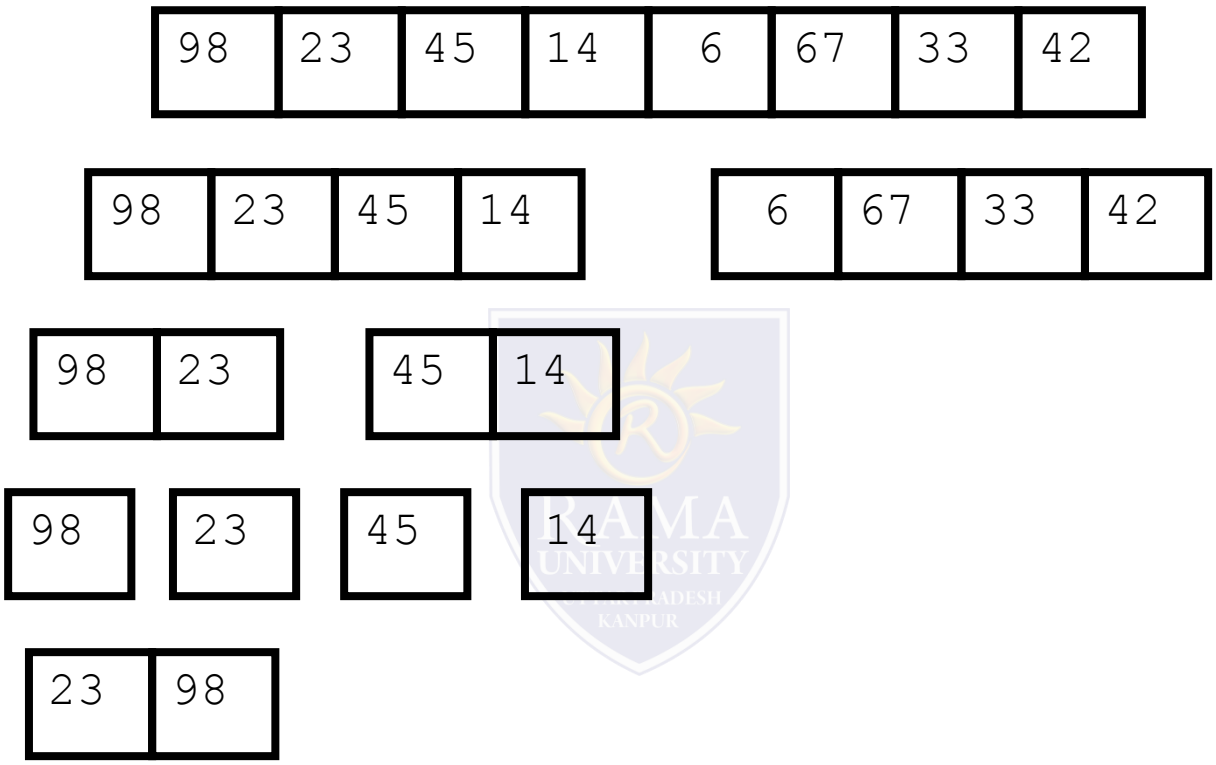
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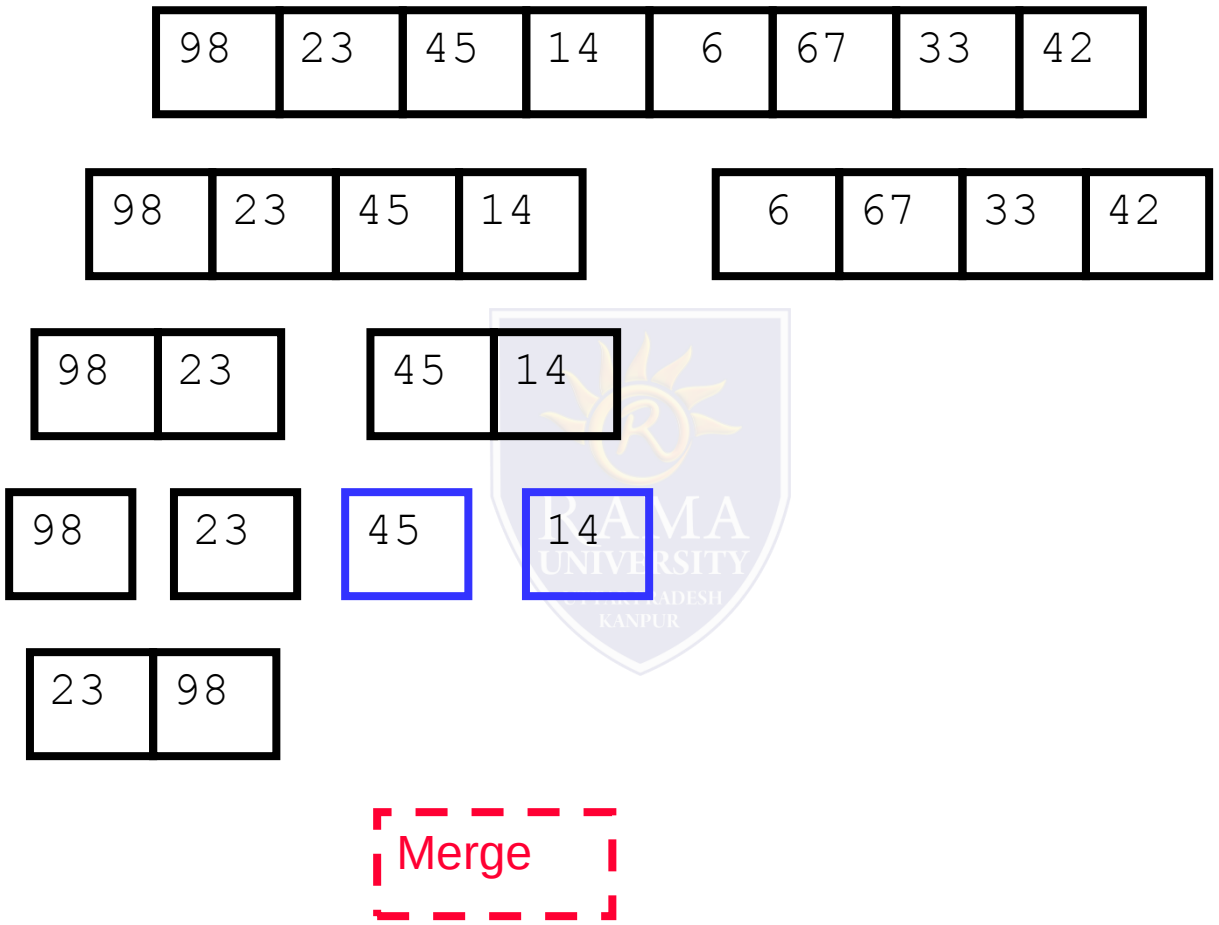
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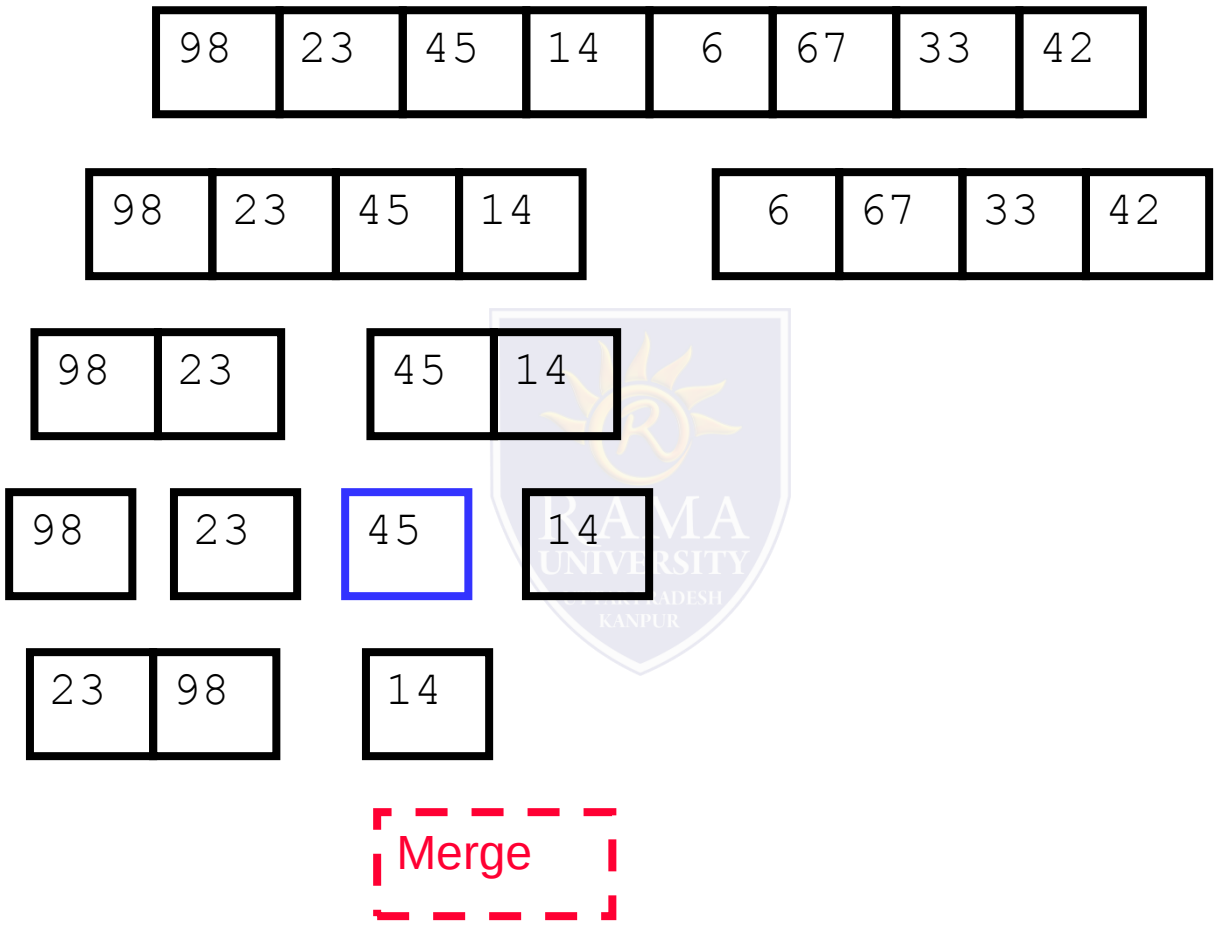
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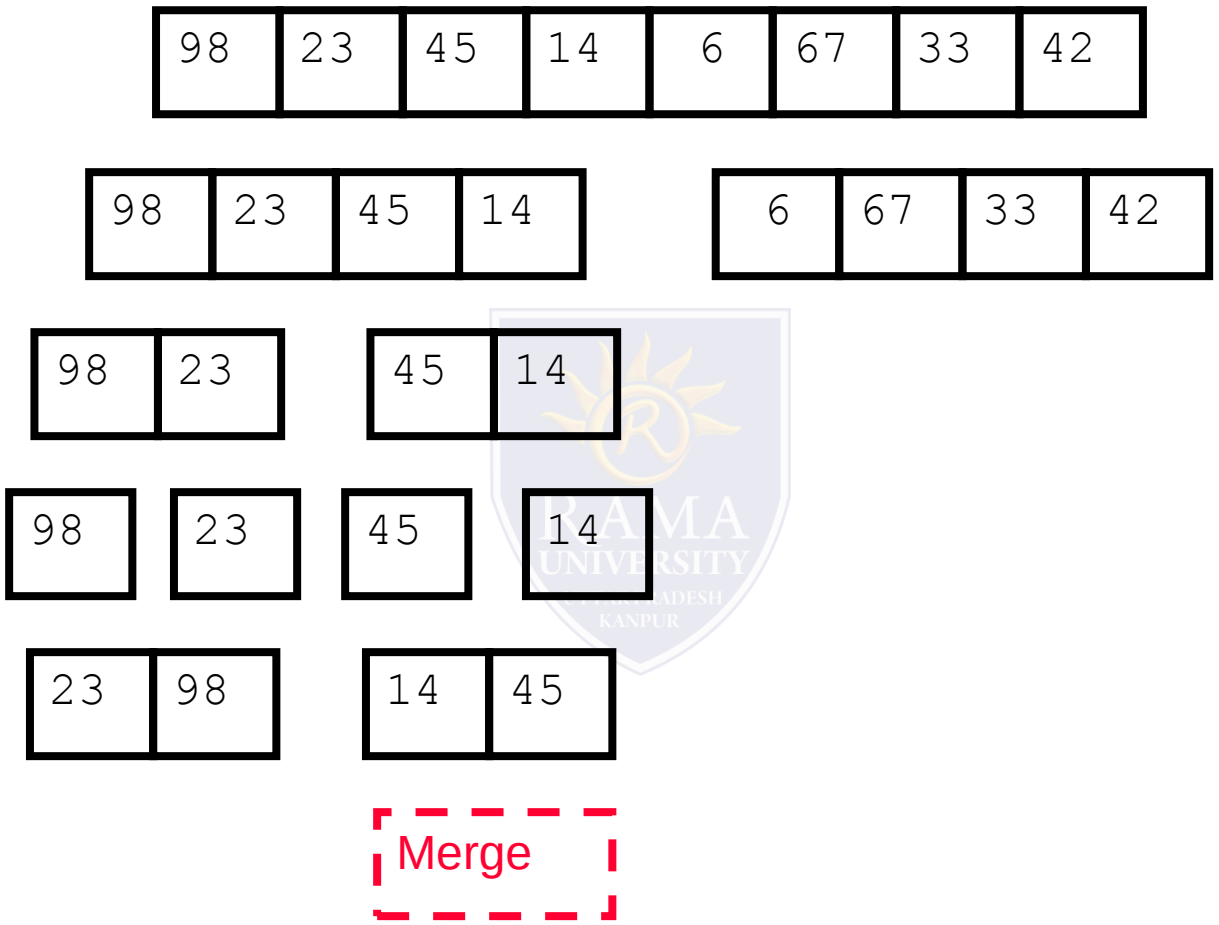
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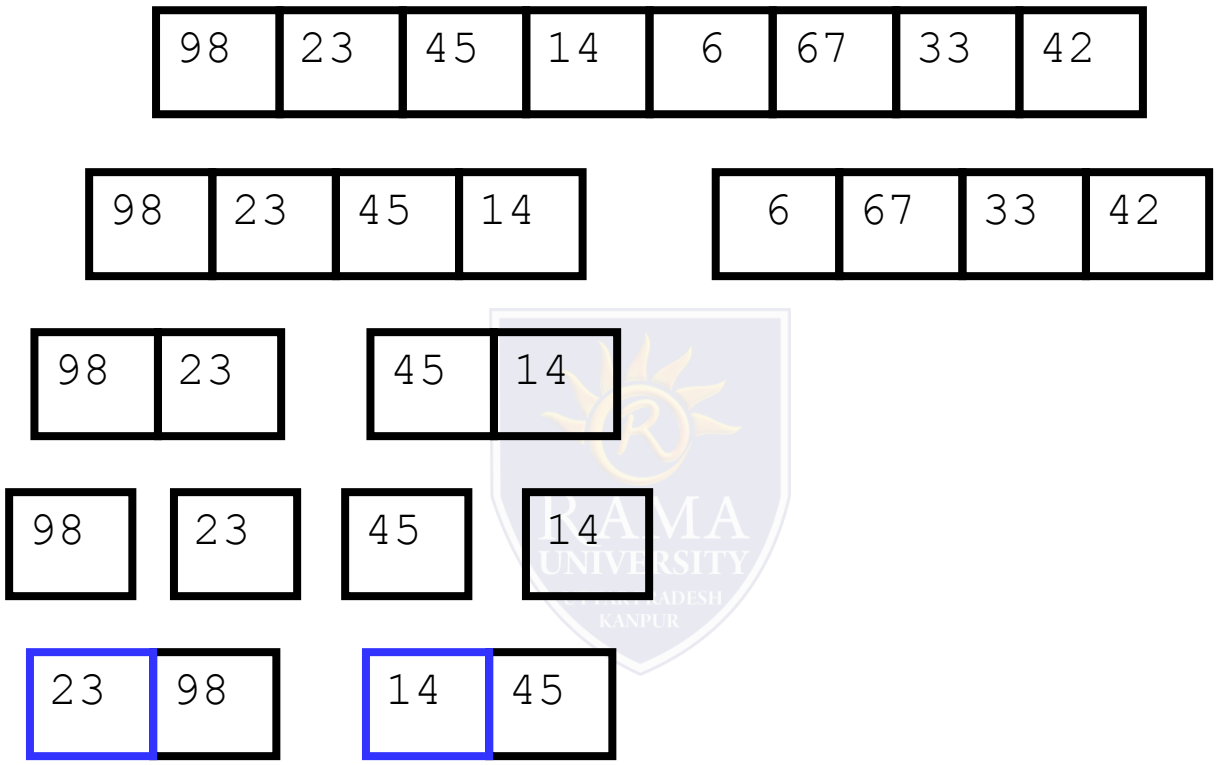
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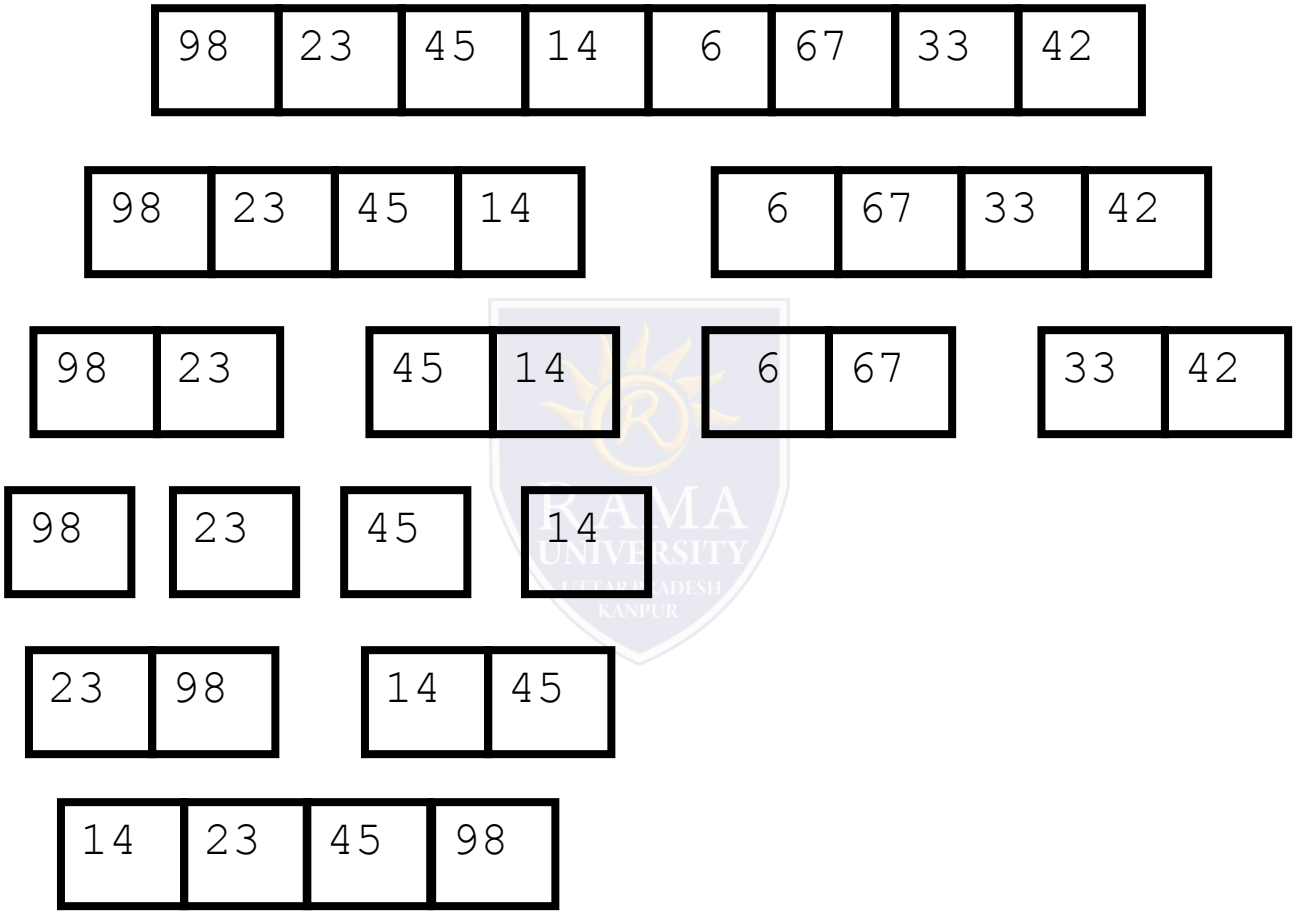
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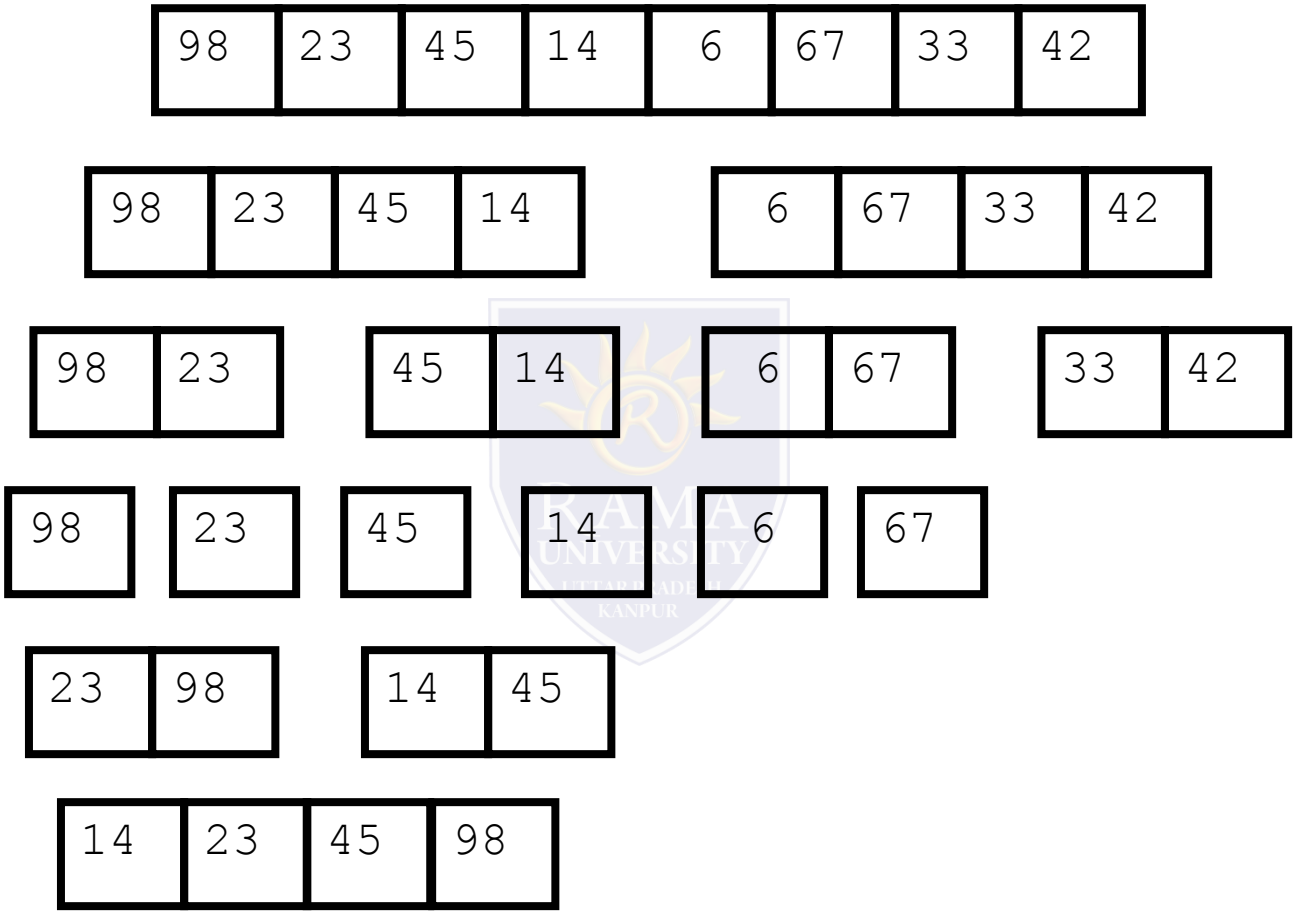
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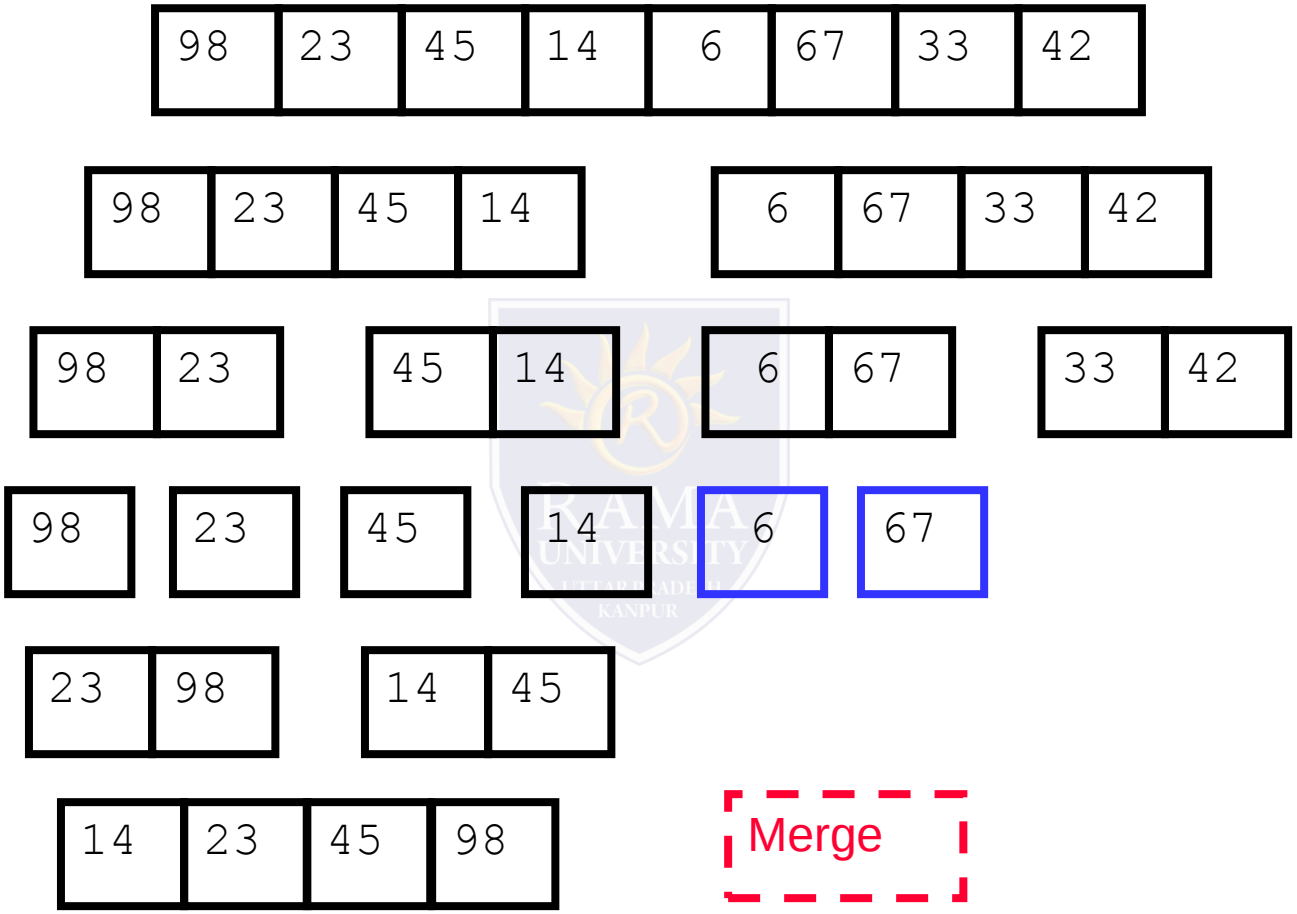
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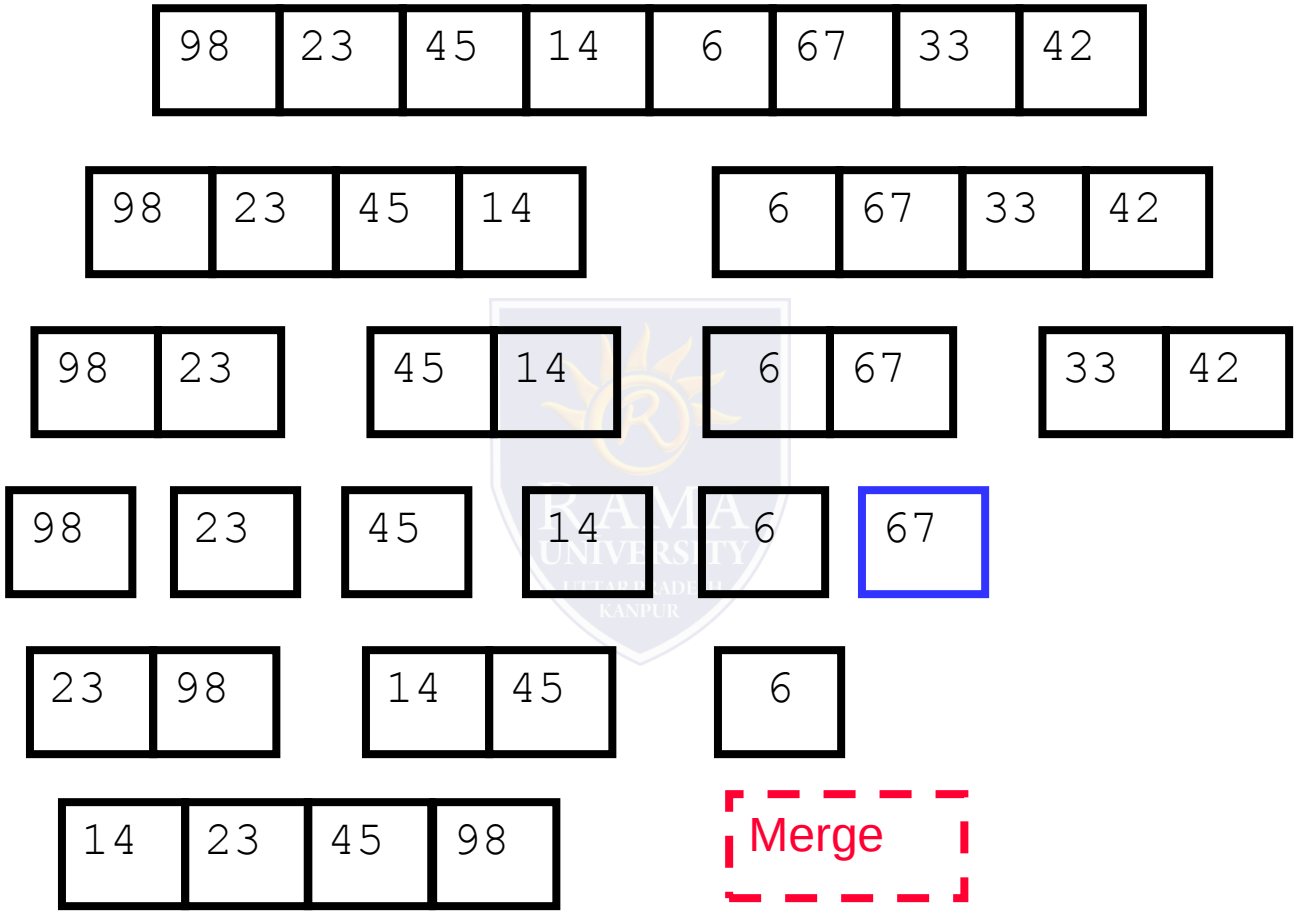
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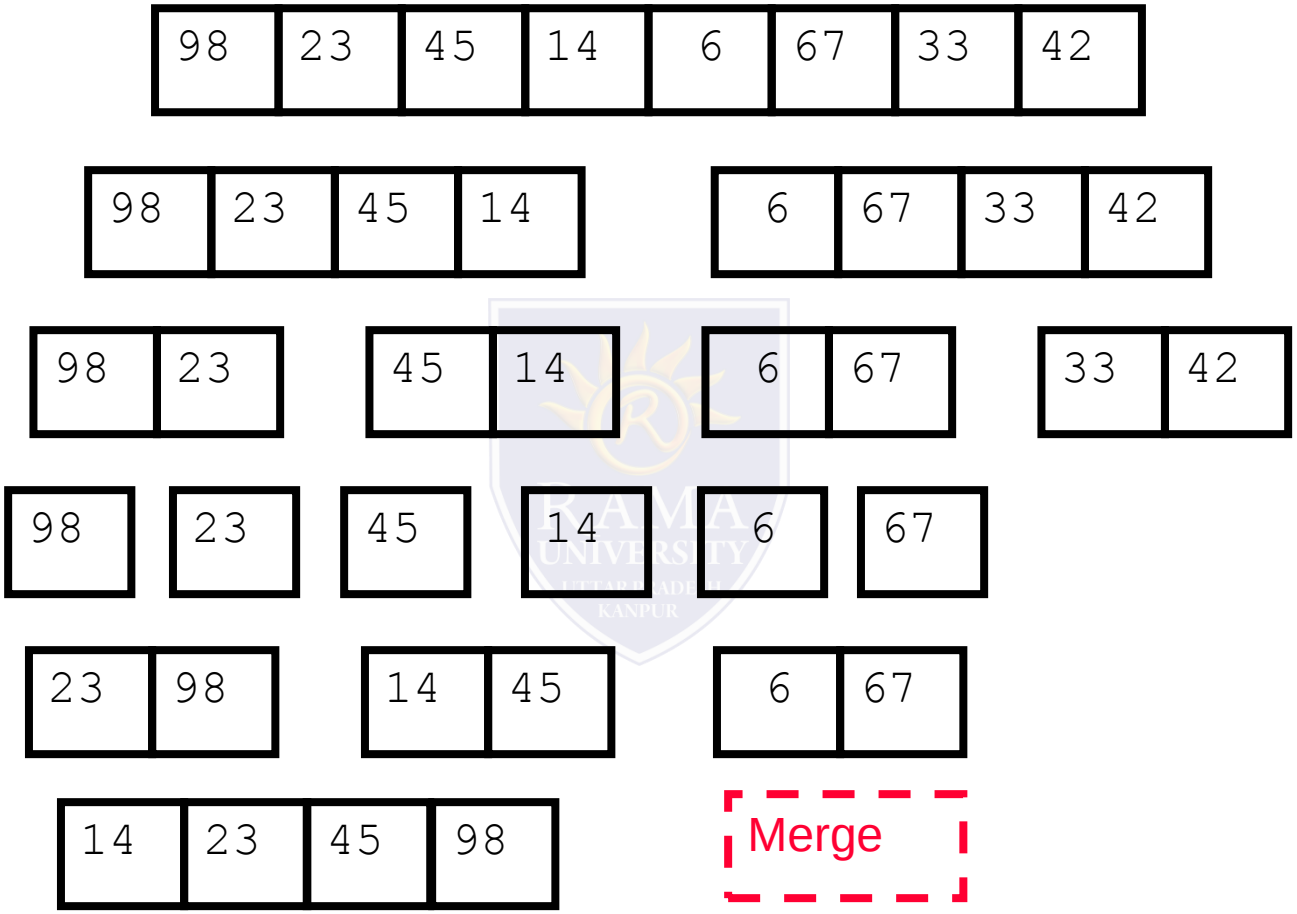
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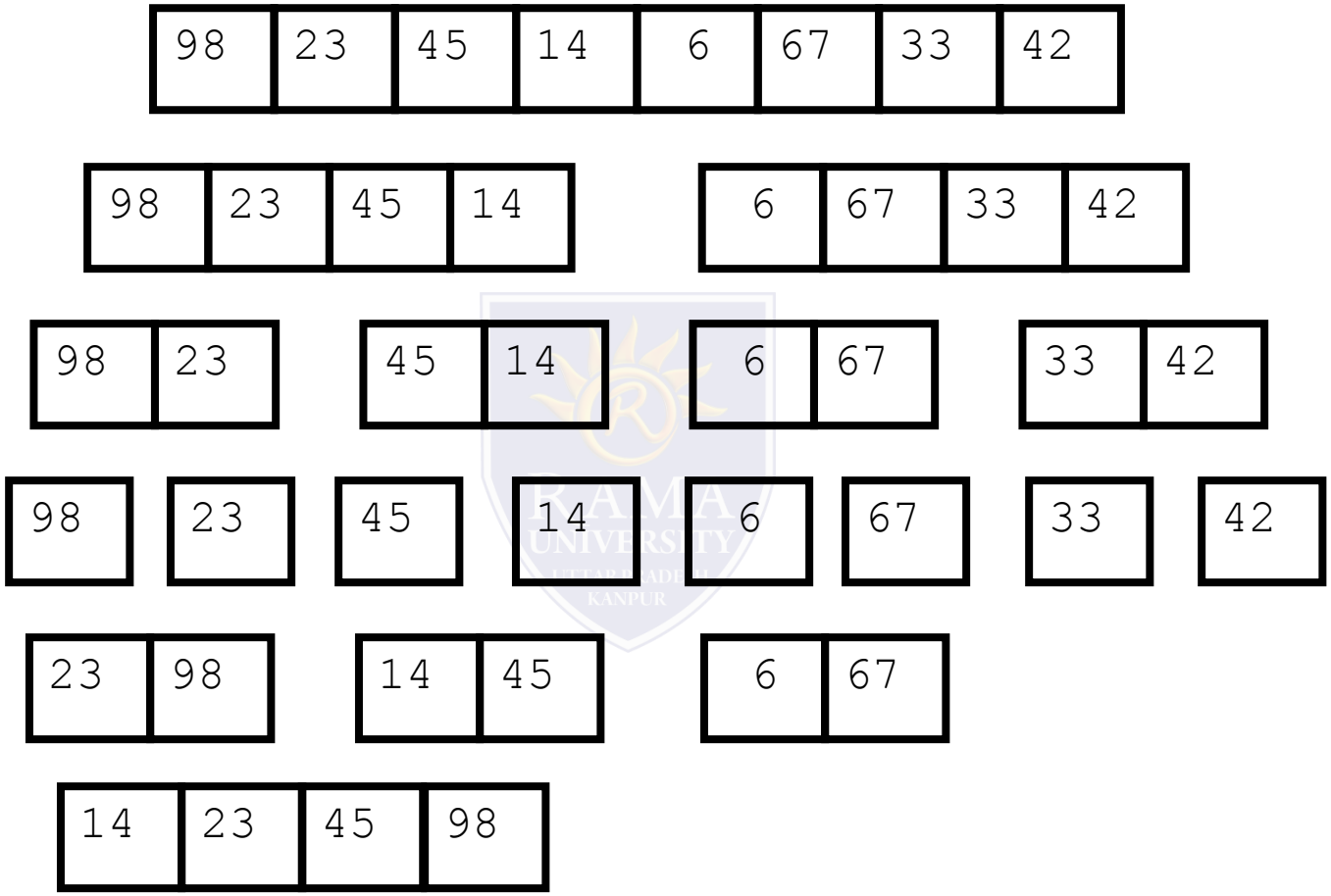
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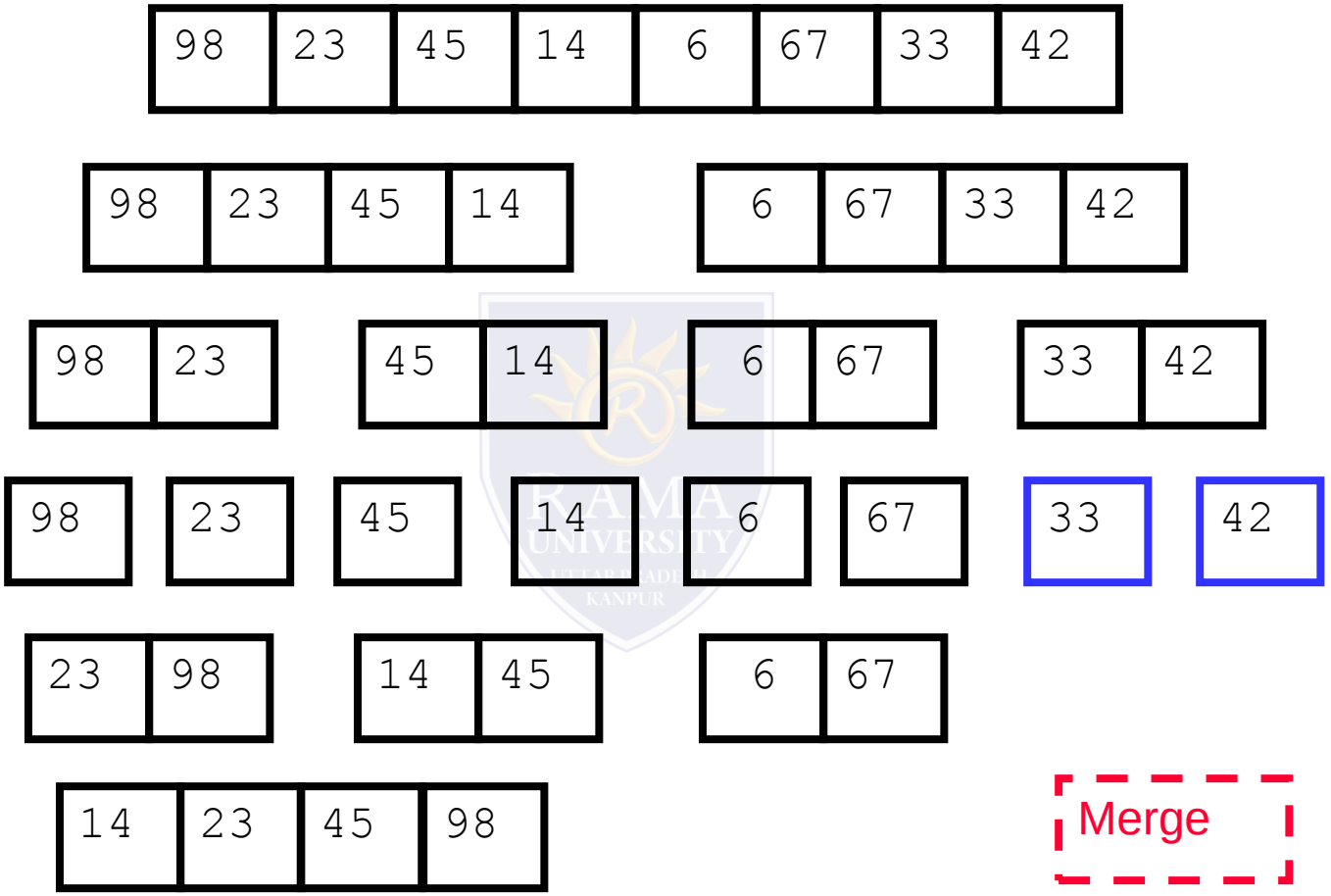
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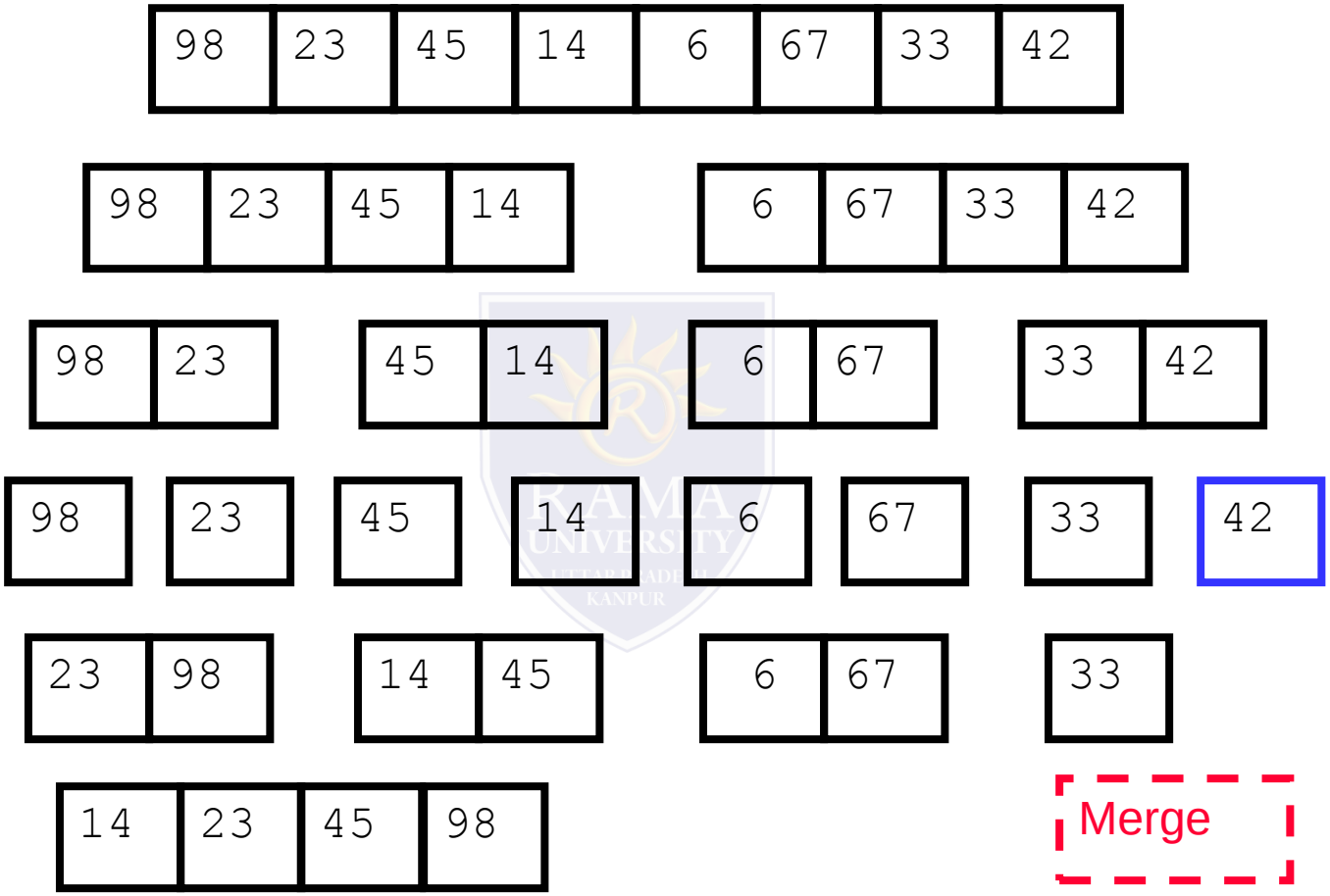
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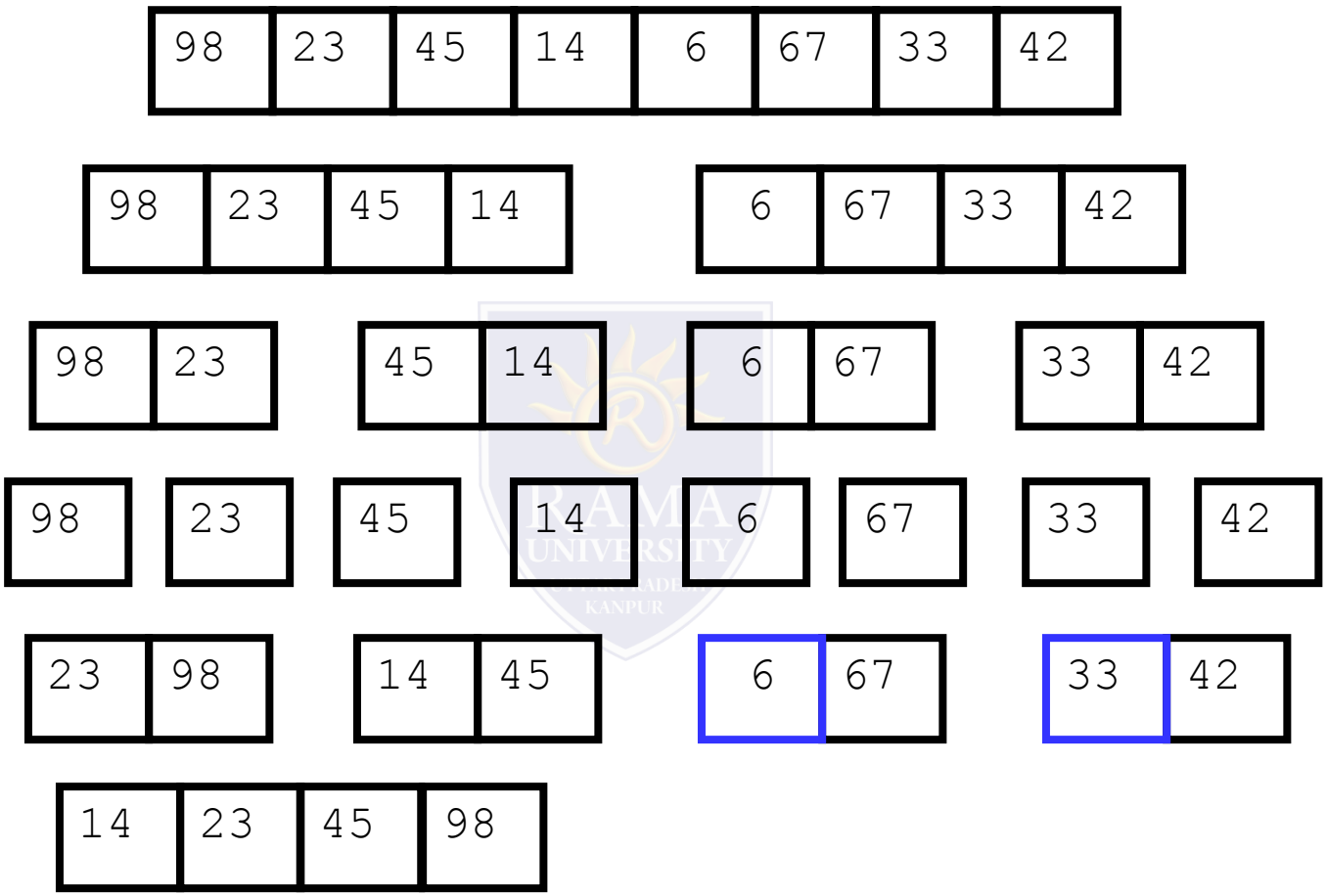
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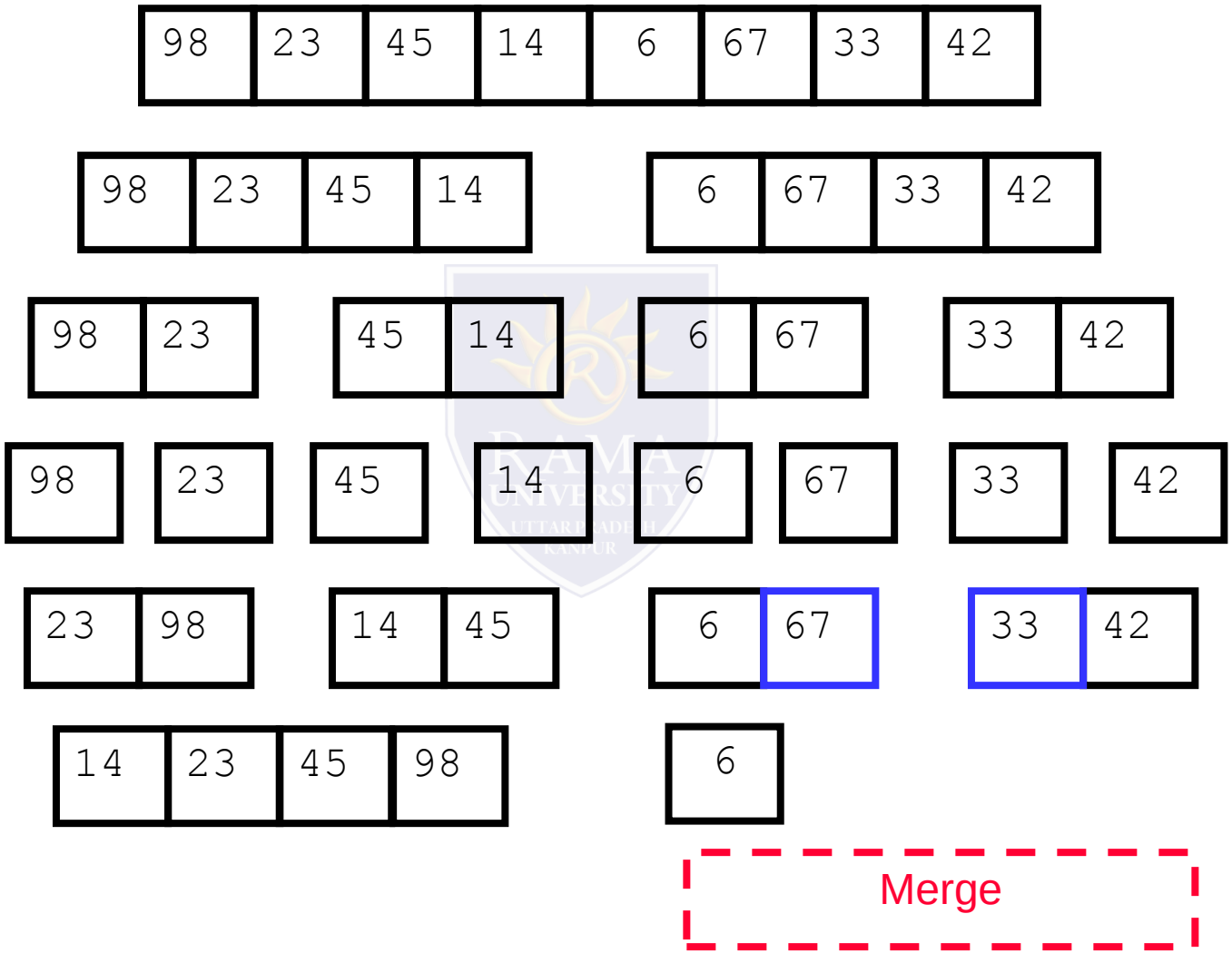
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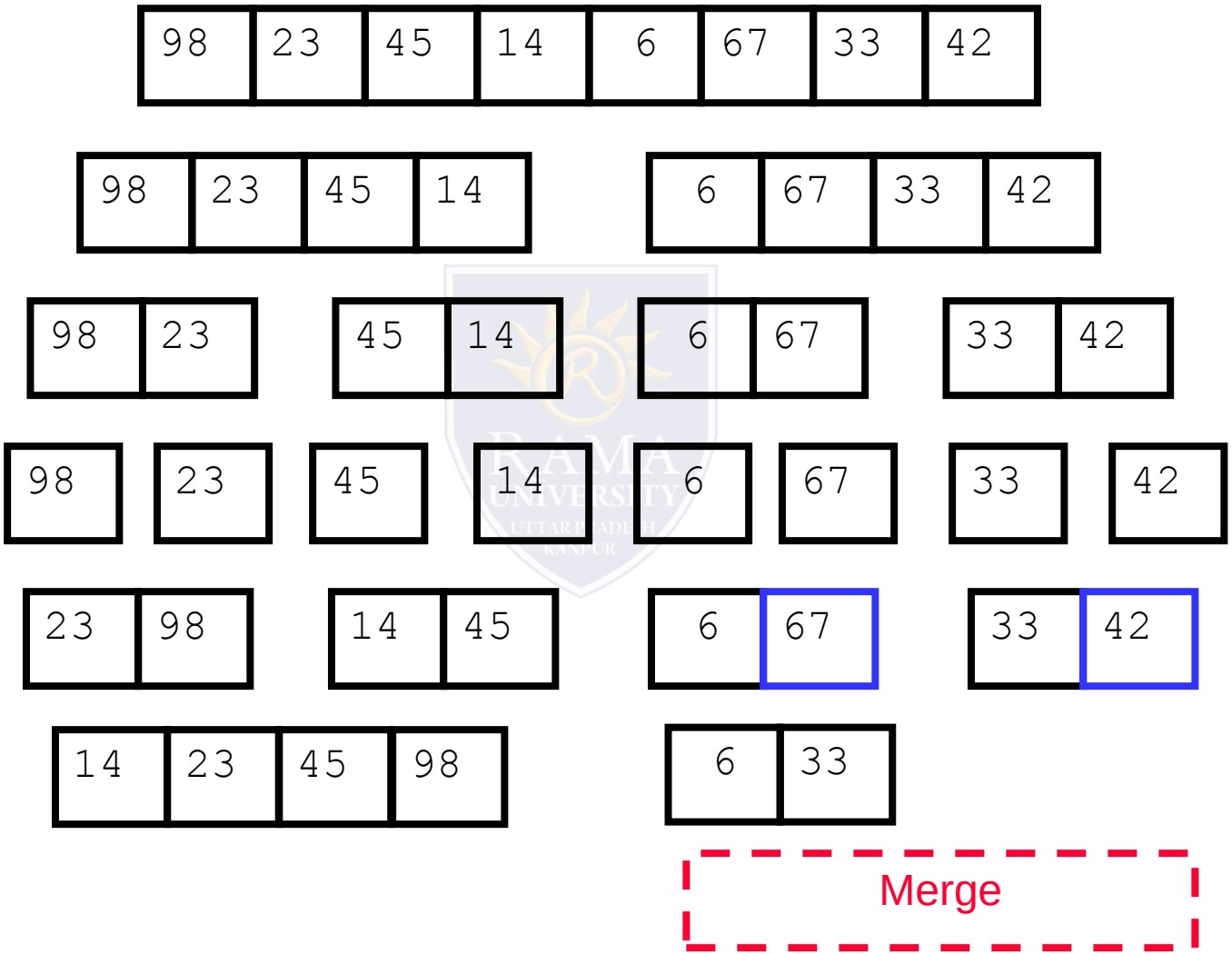
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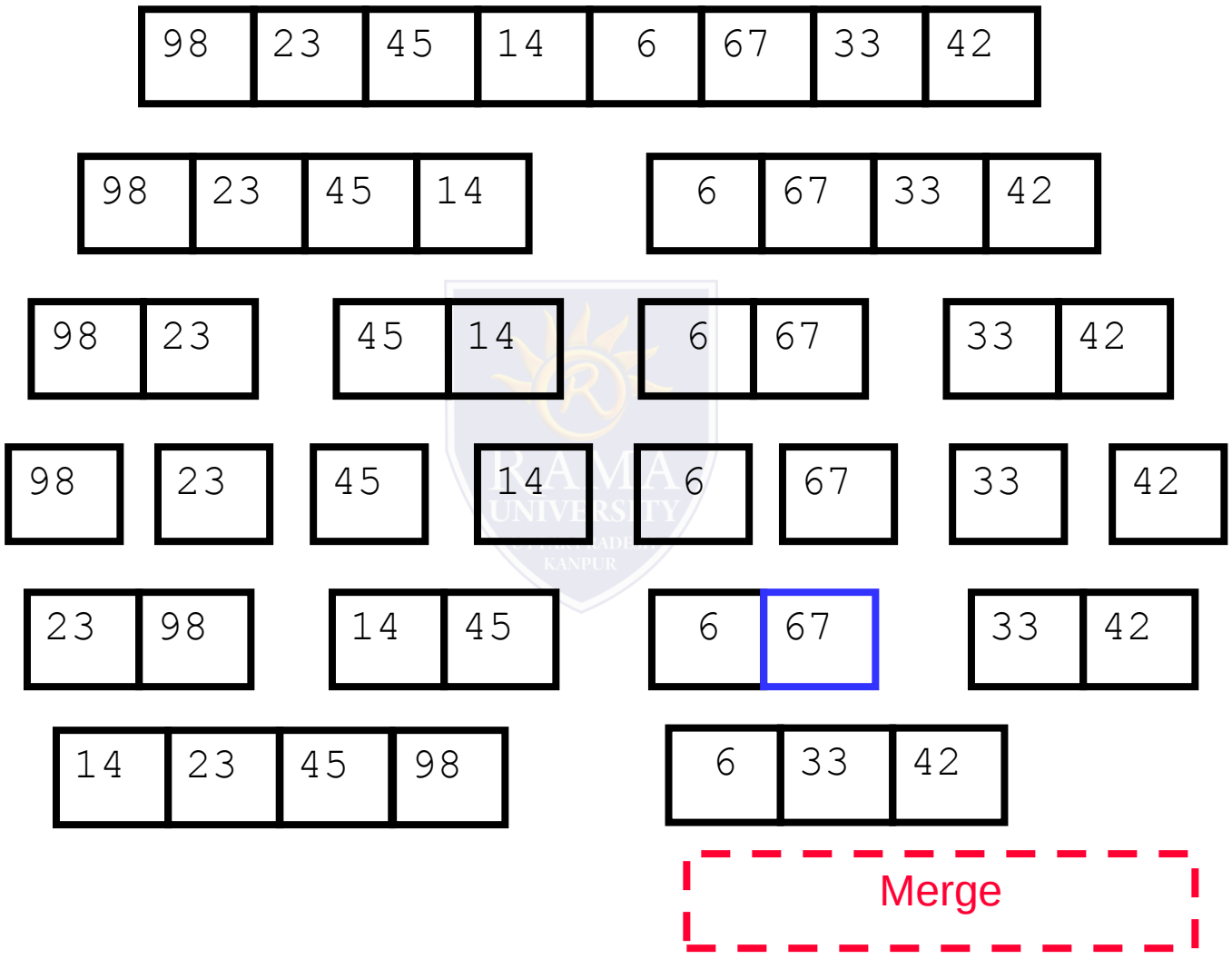
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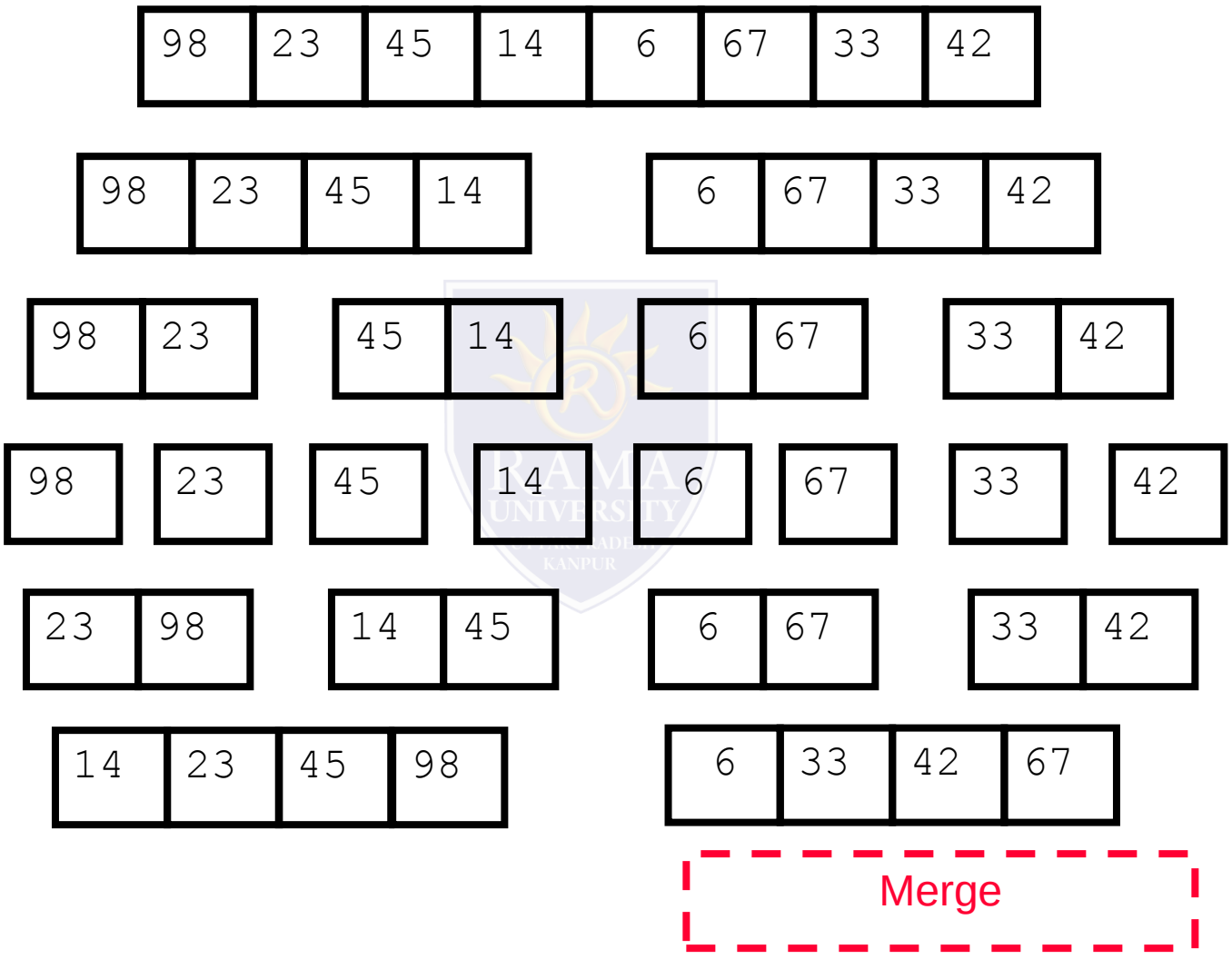
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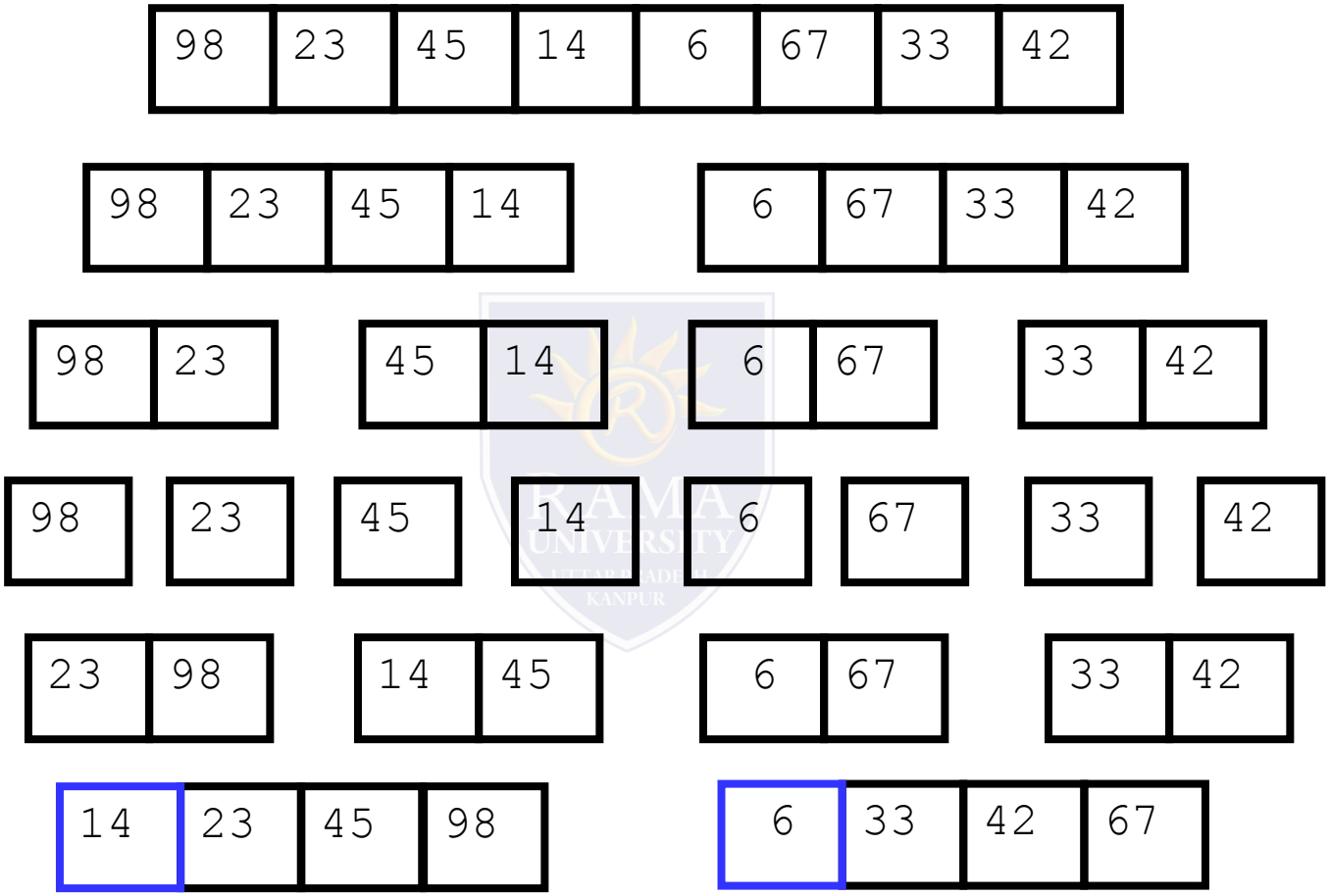
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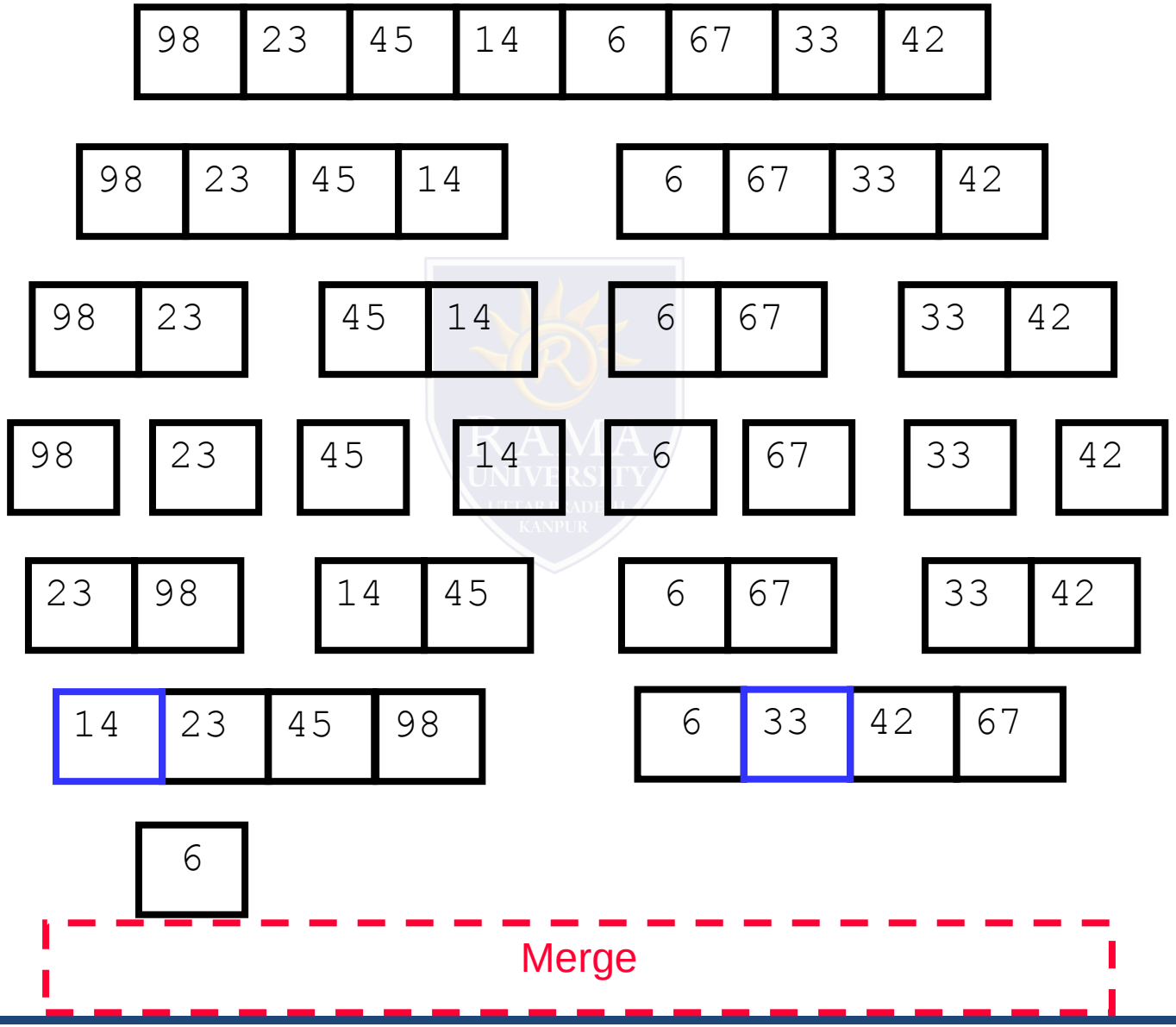
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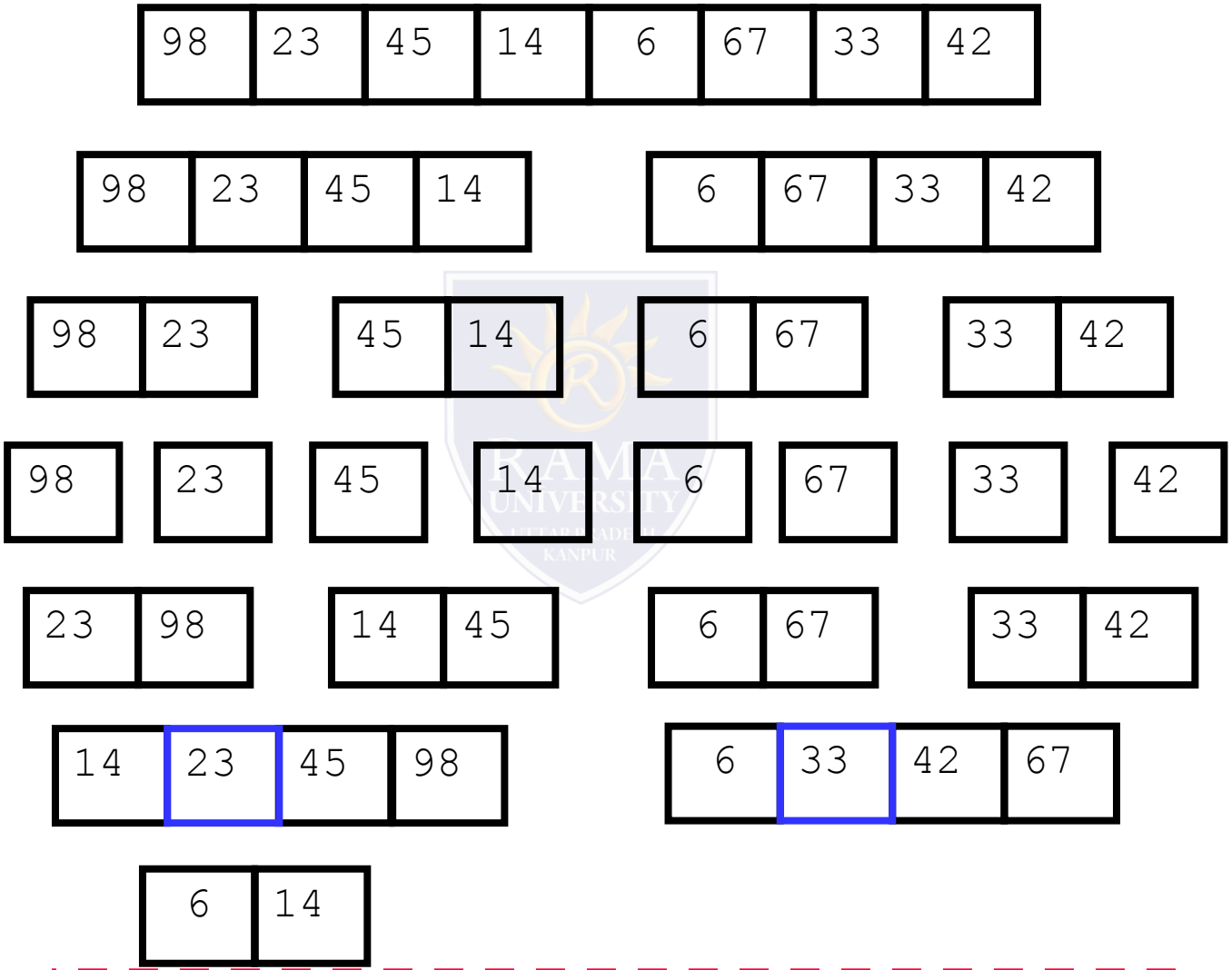
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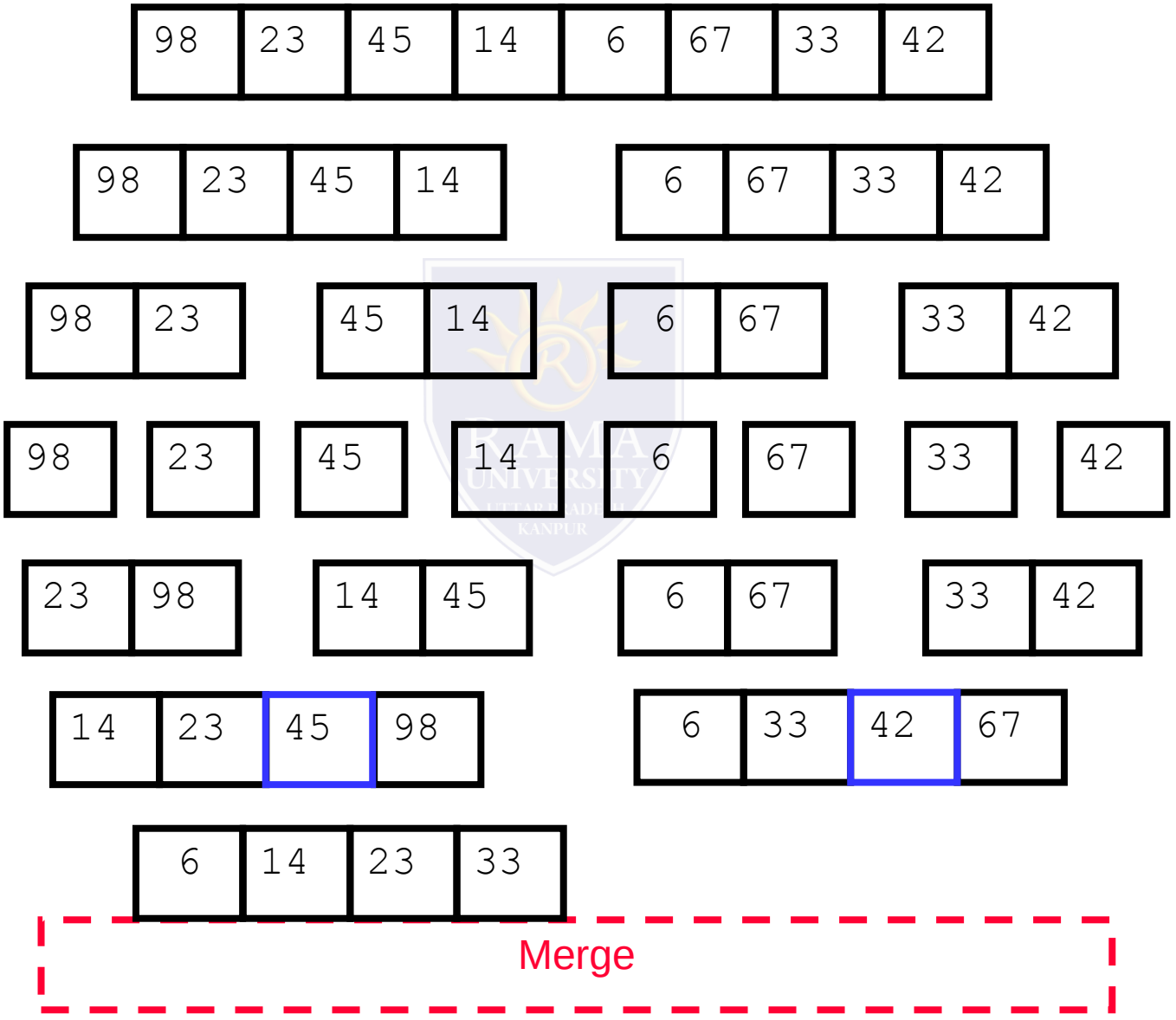
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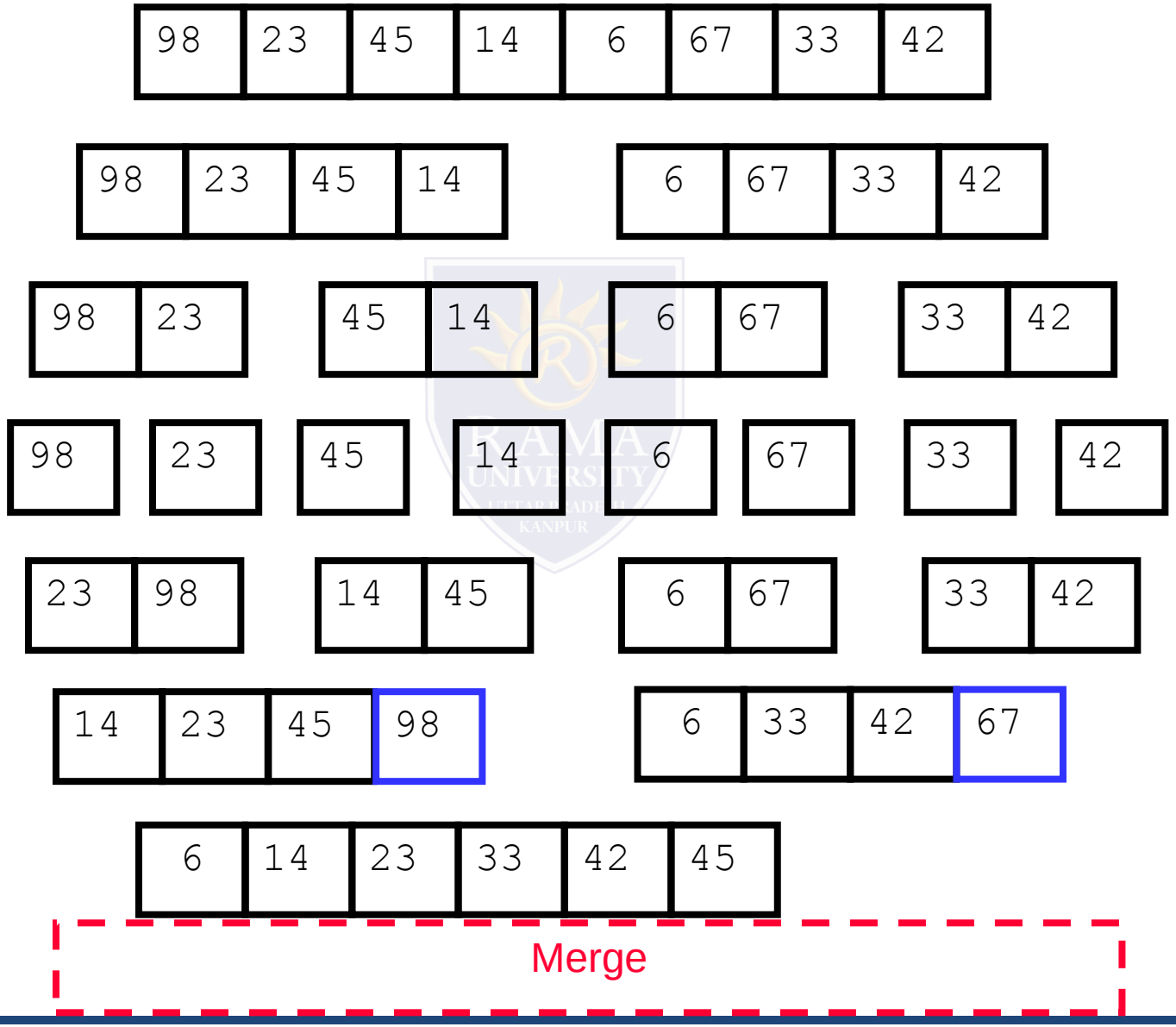
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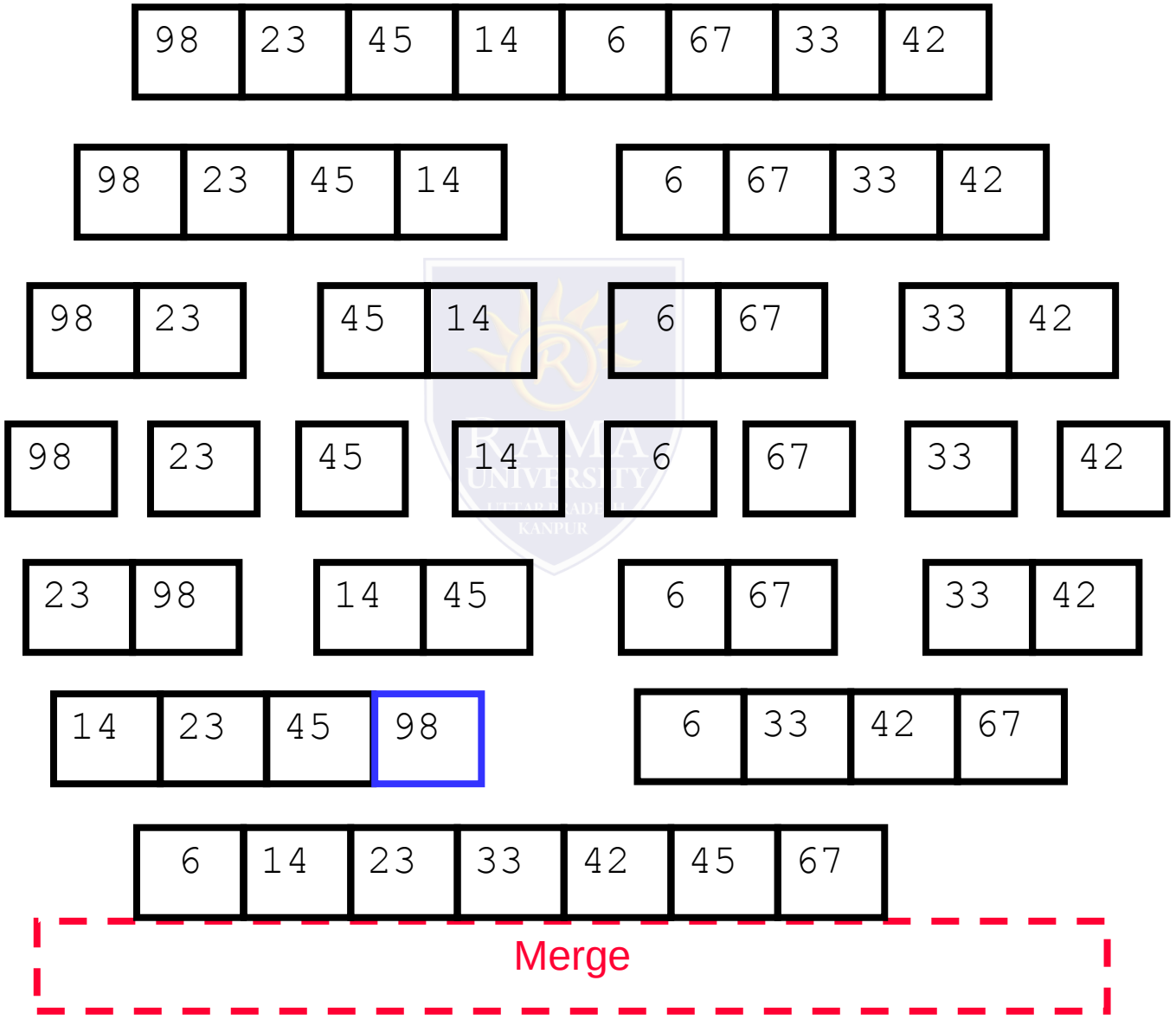
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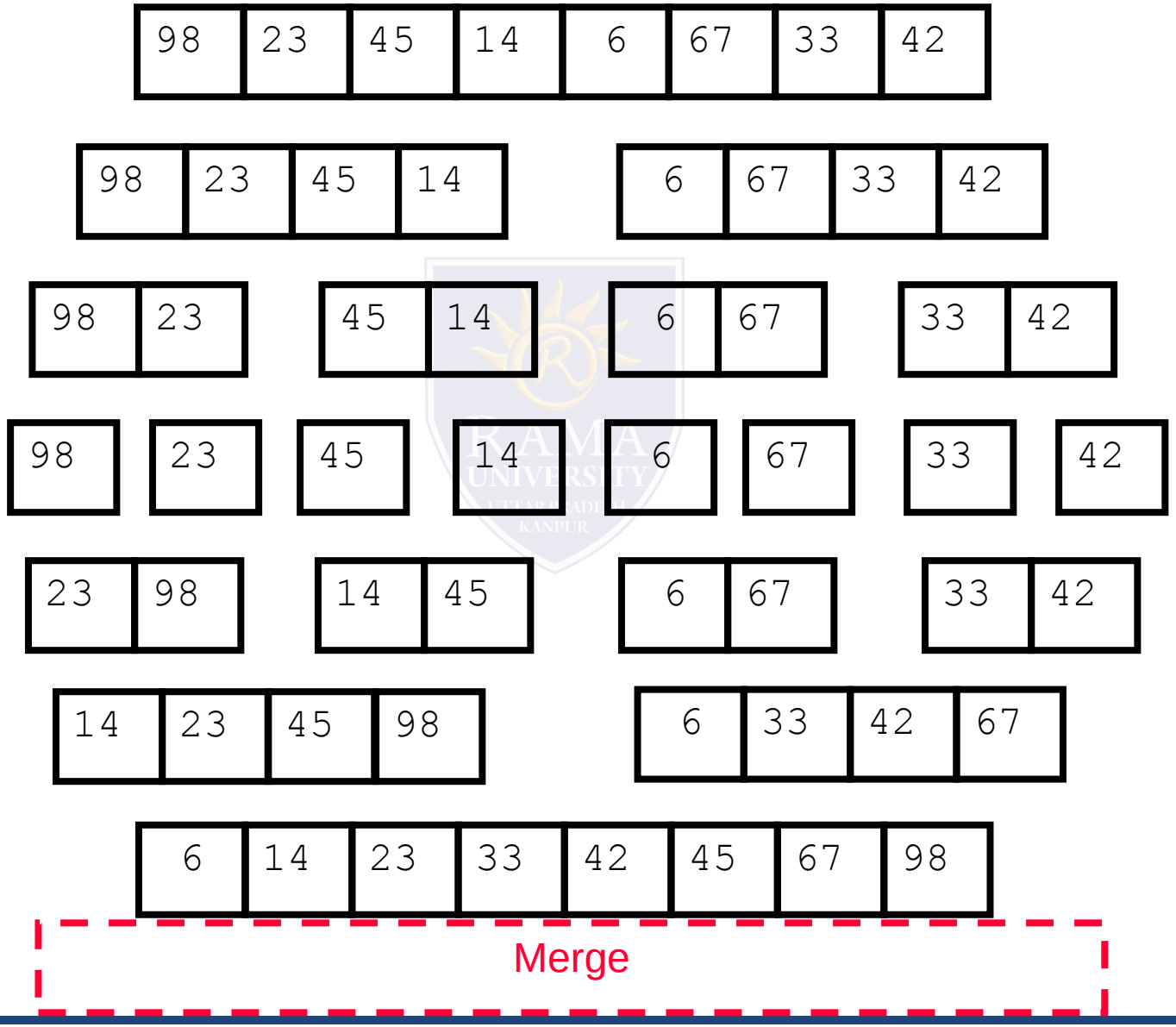
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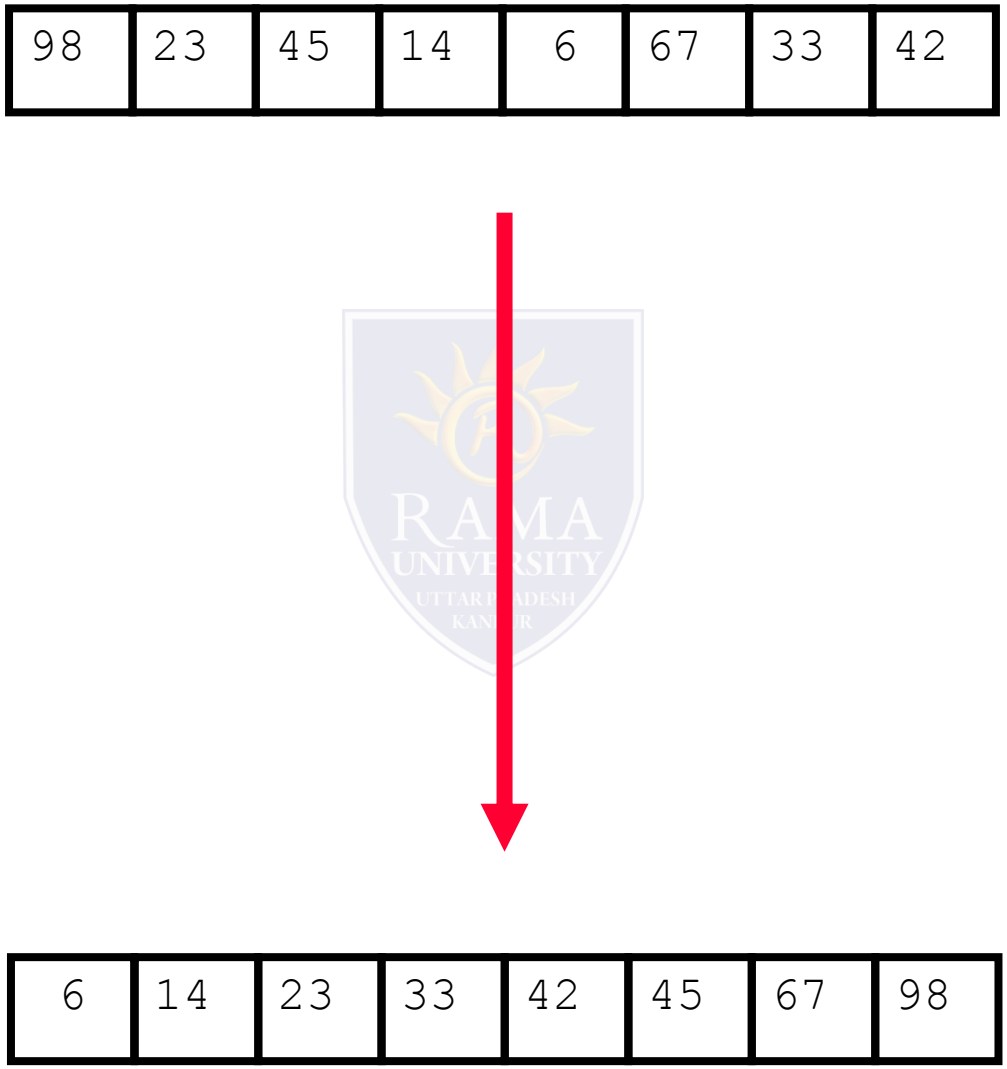
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Summary

- Divide the unsorted collection into two
- Until the sub-arrays only contain one element
- Then merge the sub-problem solutions together

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