# RADIX SORT

Radix sort is one of the sorting algorithms used to sort a list of integer numbers in order. In radix sort algorithm, a list of integer numbers will be sorted based on the digits of individual numbers. Sorting is performed from **least significant digit to the most significant digit.**

→ Radix sort algorithm requires the number of passes which are equal to the number of digits present in the largest number among the list of numbers. For example, if the largest number is a 3 digit number then that list is sorted with 3 passes.

# RADIX SORT ALGORITHM

**Step 1 -** Define 10 queues each representing a bucket for each digit from 0 to 9.

**Step 2 -** Consider the least significant digit of each number in the list which is to be sorted.

**Step 3 -** Insert each number into their respective queue based on the least significant digit.

**Step 4 -** Group all the numbers from queue 0 to queue 9 in the order they have inserted into their respective queues.

**Step 5 -** Repeat from step 3 based on the next least significant digit.

**Step 6 -** Repeat from step 2 until all the numbers are grouped based on the most significant digit.

# *RADIX SORT* ALGORITHM

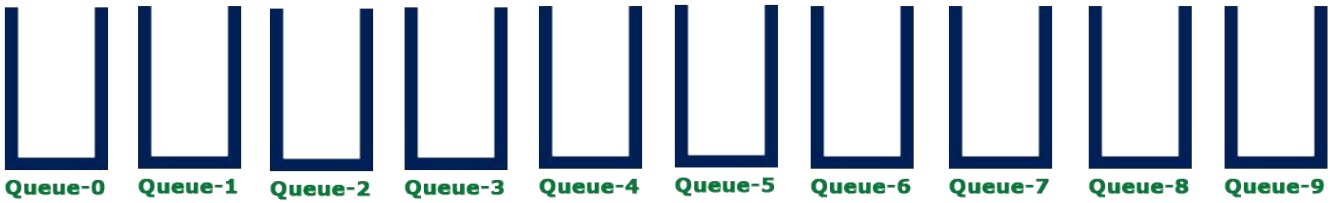
```
radixSort(array)
  d <- maximum number of digits in the largest element
  create d buckets of size 0-9
  for i <- 0 to d
    sort the elements according to ith place digits using counting Sort

countingSort(array, d)
  max <- find largest element among dth place elements
  initialize count array with all zeros
  for j <- 0 to size
    find the total count of each unique digit in dth place of elements
    and store the count at jth index in count array
  for i <- 1 to max
    find the cumulative sum and store it in count array itself
  for j <- size down to 1
    restore the elements to array
    decrease count of each element restored by 1
```

# RADIX SORT EXAMPLE

Consider the following list of unsorted integer numbers

82, 901, 100, 12, 150, 77, 55 & 23

**Step 1 -** Define 10 queues each represents a bucket for digits from 0 to 9.




**Step 2 -** Insert all the numbers of the list into respective queue based on the Least significant digit (once placed digit) of every number.

8**2**, 90**1**, 10**0**, 1**2**, 15**0**, 7**7**, 5**5** & 2**3**

Pass - 1


Group all the numbers from queue-0 to queue-9 inthe order they have inserted & consider the list for next step as input list.

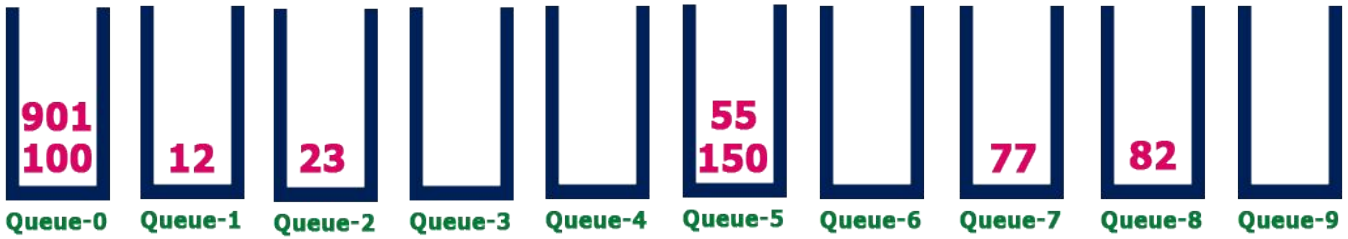
# RADIX SORT EXAMPLE

100, 150, 901, 82, 12, 23, 55 & 77

**Step 3 -** Insert all the numbers of the list into respective queue based on the next Least significant digit (Tens placed digit) of every number.

1**0**0, 1**5**0, 9**0**1, **8**2, **1**2, **2**3, **5**5 & **7**7

Pass - 2




Group all the numbers from queue-0 to queue-9 inthe order they have inserted & consider the list for next step as input list.

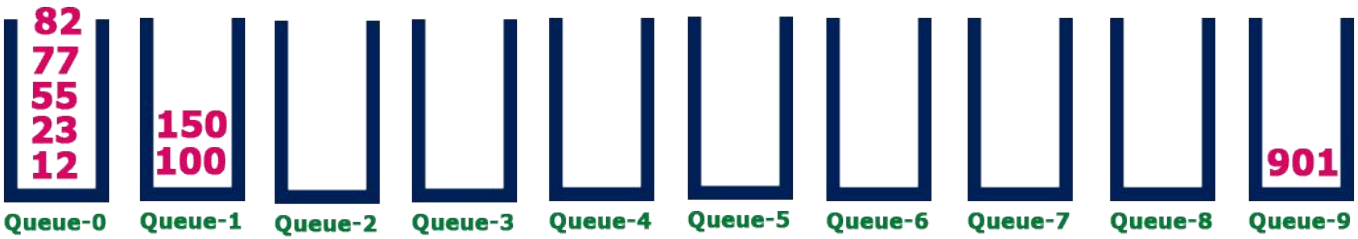
100, 901, 12, 23, 150, 55, 77 & 82

# RADIX SORT EXAMPLE

Pass - 3

**Step 4 -** Insert all the numbers of the list into respective queue based on the next Least significant digit (Hundres placed digit) of every number.

**1**00, **9**01, 12, 23, **1**50, 55, 77 & 82




Group all the numbers from queue-0 to queue-9 inthe order they have inserted & consider the list for next step as input list.

**12, 23, 55, 77, 82, 100, 150, 901**

List got sorted in the incresing order.

# *Radix Sort*

# Thank You.

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