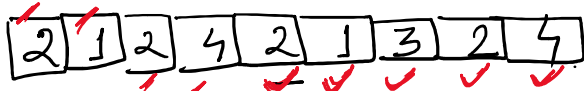


Linear Time Sorting algorithm.

Counting sort - Elements ka frequency (count)

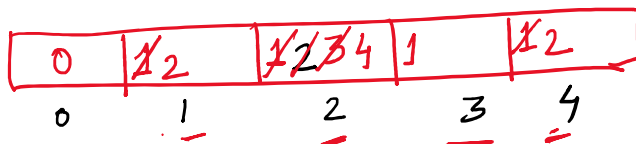
eg Array -



① Array \rightarrow Count Array \rightarrow frequency of elements.

Count array size = Max element (array) + 1

Count array ka size



Sorted order \rightarrow 1 1 2 2 2 2 3 4 4

SC $\rightarrow O(\text{Max_ele}(\text{array}))$

TC $\rightarrow O(n+k)$ $\rightarrow n \rightarrow$ no of elements input array.
 $k \rightarrow$ Max element of array.

Handwritten - ① -ive integer in input array.

② max_ele $= 10^9$. (Max space $= 10^5$ to 10^6)

Radix sort -

904,
046
005,
074,
062,
001

\Rightarrow

001
062
904
074
005
046

\Rightarrow

001
904
005
046
062
074

\Rightarrow

001
005
046
062
074
904

① Find max element.
 $= 904$

② Find no. of digit in max element.
 $= 3$.

③ Append 0's / Add 0's.

\rightarrow $n = \text{no of elements}$ $k = \text{no of digit in max element}$

0 0!

0 9 6 0 + 1 0 0 1 Add 0's.

TC $\rightarrow O(n \times k)$ $k \equiv$ No. of digit in max element

\downarrow

$O(n \times 19)$ 10^{19} $k = 19$

$\approx O(n)$

Hw Shell sort: \rightarrow ~~Imp~~.