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Advanced Algorithms

2.9

1. So the assumptions I will make to start are:

a. each card has 80 columns as said

b. A card sorter has 2000 cards/min

c. We are sorting 20 columns for each card

d. We go in ascending order

e. We have 13 buckets to put them in (one for each digit possible).

f. An example card of 20 digits (columns) would look like: 0123456789xy3456789

The radix sort process is fairly simple, we look at each digit starting right to left and create buckets of similar numbers that we can then continue to sort moving in digits to the left. We have 10,000 cards and for each iteration of “radix-sort” we need to sort all 10,000 cards for 1 column. If that takes 2000 cards per minute, then we can sort 1 column (of the 20 required ) in 5 minutes. Therefore, to sort all cards while stopping in between each column, this would take 100 minutes.

With that in mind, we know that roughly it would take (2000 \* 80 ) / min = 16000 columns /min. Each card has 20 columns (20 digits) we need to sort.

The bucket sort process is fairly simple, we look at each digit starting right to left and create buckets of similar numbers that we can then continue to sort moving in digits to the left. If we use this process we would need to sort total of 20 columns \* 10000 cards = 200,000 columns. At roughly 16000 columns per minute. We sort then the first 10,000 columns (1 column for each card …. Ie the 1st bucket) in roughly 5/8 of a minute. We need to sort a total of 200,000 columns (the other 19 buckets + the first bucket) so therefore (200,000 columns /(10,000 columns)) \* (5/8 min) = 12.5 minutes!

Yours:

A card sorter sort 2000 cards/min

WE have 10,000

First bin :

* 5 mins to sort 1 column
* There are 20 columns , therefore 5\*20 = 100 minutes