Hands On 11

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1a) Use the aggregate method in the aggregate method we consider the total cost across all the insertions and calculate the average cost per insertion.

when inserting the i^{th} element, if a resize operation is not needed the existing happens cost $O(i)$ as it involves copying the existing elements to the new table of size $2k$ (k is number of resizes performed)

The cost $= O(n)$ $k = O(n \log n)$

cost per insertion $= O(\log n)$

Runtime per insertion $= O(\log n)$

Total time is $O(n) \& \log(n+1)$

b) Accounting method :- In the accounting method, we assign each insertion a higher "amortized" cost the store "credits" that pay for future resizing costs.

Psedo code :-

```
for i=1 to n
    if table is full
        newtable = create new table
        with size then copy elements
        from old table to new table
        table = new_table
    insert element i into table
        initial charge = 0
```

for i = 1 to n

charge += 2

if table doubled, in size from

into 2m

credits += m

total charges = 2*n = O(n)

total credits = m + 2m ——— $\frac{n}{2}$ * m = O(n)

Amortized cost per insertion

= total / n

= O(n/n)

= O(1)

Runtime per insertion O(1)

total time O(n)