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COMPS - C31
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AA Experiment 1 (B)

Aim: Amortized Analysis (Accounting Method) of Dynamic Table.

Theory:
Amortized analysis by accounting method is a technique used to analyse the time complexity of dynamic data structures such as Dynamic tables.

In this method each operation is assigned an amortized cost which may be higher or lower than the actual cost. The difference between amortized cost & actual cost is stored as credit or debits on an accounting schemes.
These are used to compensate for future operations that might be more or less expensive than their amortized cost. The key objective is to ensure over a sequence of observation the sum of amortized cost accurately represents the total actual cost

Observation:
a doubling & copying cost is encountered only during resizing. for each insertion operation an insertion cost of 1 is counted. The charge represents the amortized cost assigned to each operation & the Bank reflects the accumulated cred

Conclusion: Thus, we performed Amortized analysis using accounting method.

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Code:

```
n = 9

size=1
bank=0
charge=3

print("Element  Size  Doubling+Copying Cost  Insertion Cost  Total Cost  Charge  Bank")

for i in range(1,n+1):
    icost=1
    dcost=0

    if i>size:
        size*=2
        dcost=i-1

    total=icost+dcost
    bank+=(charge-total)

    print(i,"\t\t",size,"           ",dcost,"\t\t\t\t\t",icost,"\t\t\t\t",total,"\t\t",charge,"\t\t",bank)
```

Output:

Element	Size	Doubling+Copying Cost	Insertion Cost	Total Cost	Charge	Bank
1	1	0	1	1	3	2
2	2	1	1	2	3	3
3	4	2	1	3	3	3
4	4	0	1	1	3	5
5	8	4	1	5	3	3
6	8	0	1	1	3	5
7	8	0	1	1	3	7
8	8	0	1	1	3	9
9	16	8	1	9	3	3

Element	Size	Doubling+Copying Cost	Insertion Cost	Total Cost	Charge	Bank
1	1	0	1	1	10	9
2	2	1	1	2	10	17
3	4	2	1	3	10	24
4	4	0	1	1	10	33
5	8	4	1	5	10	38
6	8	0	1	1	10	47
7	8	0	1	1	10	56
8	8	0	1	1	10	65
9	16	8	1	9	10	66

Element	Size	Doubling+Copying Cost	Insertion Cost	Total Cost	Charge	Bank
1	1	0	1	1	1	0
2	2	1	1	2	1	-1
3	4	2	1	3	1	-3
4	4	0	1	1	1	-3
5	8	4	1	5	1	-7
6	8	0	1	1	1	-7
7	8	0	1	1	1	-7
8	8	0	1	1	1	-7
9	16	8	1	9	1	-15