Topics to discuss

Accounting Method

Example 2 : Incrementing a binary Number

Example 2: Incrementing a binary number

Considered the problem of implementing a k-bit binary counter that counts upward from 0.

Pseudo code :

```
INCREMENT(A)
1)    i = 0
2)    while i < A.length and A[i] == 1
3)        A[i] = 0
4)        i = i + 1
5)    If i < A.length
6)        A[i] = 1
```

Amortized cost :

2 for setting a bit to 1.

0 for setting a bit to 0.

Counter value	A[3]	A[2]	A[1]	A[0]	Amortized cost	Actual Cost	Credit
0	0	0	0	0	0	0	0
1	0	0	0	1	2	1	1
2	0	0	1	0	2	2	1+0 = 1
3	0	0	1	1	2	1	1+1 =2
4	0	1	0	0	2	3	2-1 = 1
5	0	1	0	1	2	1	1+1 =2
6	0	1	1	0	2	2	2 +0 =2
7	0	1	1	1	2	1	2+1=3
8	1	0	0	0	2	4	3 2 = 1

Analysis for increment operation,

We know,

Worst case T.C (Asymptotic Analysis) $= O(nk) \approx O(n^2)$

And,

Total Amortized cost $= \sum_{i=1}^{n} \hat{C}_i$ (for n increment)

$= (0+2+2+2+2+2+2+2+2)$ [for 8 increment]

$= 2 \times 8$ (for 8 increment)

$= 2 \times n$ (for n increment)

$= O(n)$

Follow Now

Start Practicing

i._am._arfin

Arfin Parween