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(1.) (a.) By aggregate method

The amortized runtime analysis of inserting 'n' elements into dynamic array that doubles size

→ Insertion cost

In insertion cost each insertion typically costs O(1) The array is full, resizing occurs, costing O(n) to copy existing elements.

→ Total Resizing cost:

The total cost of T(n) for n insertion is

$$T(n) = O(n) + O(n) = O(n)$$

where O(n) = Regular insertion

O(n) = Resizing cost

The form of geometric series

$$1 + 2 + 4 + 8 + \ldots + n/2 = n-1$$

→ Amortized cost Per instructions

The Amortized cost Per instruction is

$$\frac{T(n)}{n} = \frac{O(n)}{n} = O(1)$$

1.(b) By Accounting Method

The amortized runtime of inserting 'n' elements into dynamic array using the accounting method.

→ Cost per Insertion :- set a fixed cost (eg 3 units) for each insertion.

→ Redistribution charges :- For each doubling, reserve enough charges from previous insertion to cover the copying cost of moving existing elements.

→ Analysis Cost Per insertion :- The total charges assigned Per insertion (eg 3 units) are sufficient to cover both the insertion and the cost of copying during doubling.

∴ The each insertion amortized cost remain O(1).