Let \( T(n) = T(a_1, n) + T(a_2, n) + \ldots + T(a_s, n) + cn \)
\[
= cn + \sum_{i=1}^{s} T(a_i, n)
\]
with \( 0 < a_1 \leq a_2 \leq \ldots \leq a_s < 1 \)
and \( \sum_{i=1}^{s} a_i < 1 \) (Let us call \( \sum_{i=1}^{s} a_i = A \), so \( A < 1 \))

Recursive Tree Diagram:

Let \( k_1, k_2, \ldots, k_2 \) be the input sizes to \( T() \) for some level of the recursion tree.

The cost incurred by this level is \( \sum_{i=1}^{Z} k_i \cdot c = K \)

Let us also assume that no base case is reached in this level or the next so that we obtain an upperbound of the cost incurred by the next level.

The input sizes of the next level are thus:

\[
a_1k_1, a_2k_1, \ldots, a_sk_1, a_1k_2, \ldots, a_sk_2, \ldots, a_sk_z
\]

Thus the total cost of the level is:

\[
\sum_{i=1}^{Z} \sum_{j=1}^{s} a_j k_i \cdot c = \sum_{i=1}^{Z} (k_i \cdot c) \sum_{j=1}^{s} a_j = KA
\]
The result is that if the cost incurred by some level is $K$, the max cost incurred by the following level is $AK$.

For a finite input size $n$, we should expect a finite tree height $h$.

\[
T(n) = cn + \sum_{i=1}^{h} T(a_i, n) \leq \sum_{i=0}^{h} cnA^i \leq \sum_{i=0}^{\infty} cnA^i = cn \sum_{i=0}^{\infty} A^i = \frac{cn}{1-A}
\]

\[
\Rightarrow T(n) = O(n)
\]