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ALGORITHM find_salary (object obj)

// input : object of class Salary through which we will acess its attributes

// output : net salary and gross salary of employee

NAME : find_salary(object obj)

for each employee (1 to 2000) :
gross_salary = S.basic_salary + S.bonus + S.HRA + S.TA ~~+ S.PF~~

// HRA is House rent allowance
// TA is transport allowance.

net_salary = gross_salary - TDS - PPF - all applicable deductions.

return net_salary[ ] ;

ALGORITM min_max (net_salary[ ], low, high)

// input : array of net salaries, low & high index

// output : min and max salaries

NAME: min_max (net_salary [ ], low, high)

// Divide
mid = (low + high) / 2

// Conquer
min1, max1 = min_max (arr, low, mid)
min2, max2 = min_max (arr, mid+1, high)

overall_min = min (min1, min2)
overall_max = max (max1, max2)

return overall_min, overall_max;

ALGORITHM min_max (net_salary[])
(iterative)

// input : arr of net salaries
// output : min and max salaries

NAME min_max (net_salary[])

initialize min = net_salary[0]
max = net_salary[0]

for i from (1 to 2000) ⟶ (1 × n) → 2000
if (net_salary[i] < min)
min = net_salary[i]
if (net_salary[i] > max)
max = net_salary[i]

return min, max

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* Time complexities

① Linear

Worst case → O(n)

This will happen if the element that is min/max is the last element. We will have to go through all n elements.

Best and worst case also O(n).

② Recursive divide & conquer

Array splits into 2 halves recursively until base cases are reached.

Recurrence rel^n :- $T(n) = 2T\left(\frac{n}{2}\right) + O(1)$

- $T(n)$: Time comp of for array of size n
- $2T\left(\frac{n}{2}\right)$: 2 recursive calls for 2 halves
- $O(1)$: time for 2 comparisions is constant

using master theorem, $a=2$ $b=2$ $d=0$

time comp = $O(n^{\log_b a}) = O(n^{\log_2 2}) = O(n)$

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worst case O(n)

→ when the recursive splitting happens upto single elements

TEST-CASES

I have 5 csv files such that they have positive test cases and 5 of negative.

They are csv files, so I cannot hand-write them.

However all inputs ; outputs have been attached.

Conclusion

We researched about how to find out gross and net salary of a person. We wrote a code for the same. We found max & min salaries using linear and divide & conquer technique. Both have time comp O(n).