Group 7

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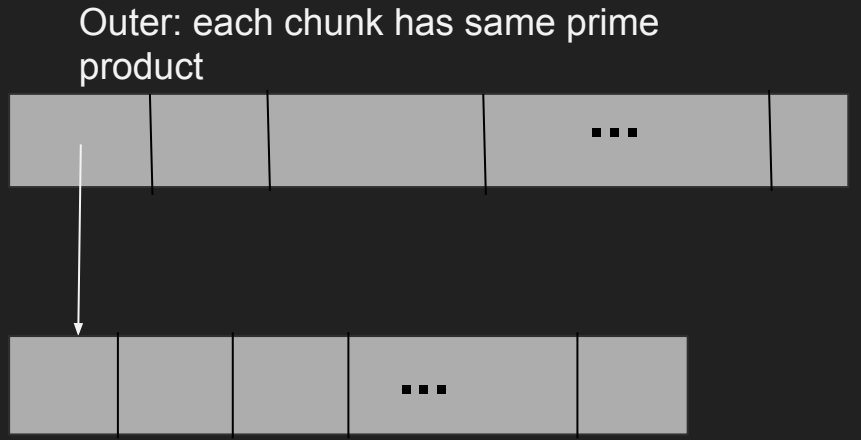
Sorting Competition 2017

Algorithm

1. Quicksort based
2. Two times of sorting (Outside and Inside)
    a. A new class for number (Type: long)
        i. Prime product
        ii. Value of the number itself
    b. Outside sorting: prime product
    c. Inside sorting: value of number



Algorithm (Outside Sorting)

Quick sort with:

1. Insert sort.
2. Median of three to choose pivot
3. Put the elements which have same value of pivot together, as a group to sort.

Efficiency:

average:Θ(nlog2n)

Worst case: Θ(n^2)

Example: (The following numbers are represent prime product)

Original array: 1,2,6,7,6,6,7,6,11,6

Median of three: pivot is 6 with index 4.

6,2,6,7,1,6,7,6,11,6

Put the same elements to the two ends of array:

6,2,1,6,7,11,7,6,6,6

Put the number together: 1,2,6,6(p),6,6,6,7,11,7

The sub-array for next sorting: 1,2 and 7,11,7

Algorithm (Inside Sorting)

Quick sort with:

1. Insert sort.
2. Median of three to choose pivot
3. (Put the elements which have same value of pivot together, as a group to sort.)

Efficiency:

average:Θ(nlog2n)

Worst case: Θ(n^2)

Find the median of these three, and swap median to a[low]

(In partition(), we choose a[low] as pivot.)

Results and Correctness

Outside sort: quicksort + insertion sort + median of three + same elements together

Inside sort: quicksort + insertion sort + median of three

	Data 1	Data 2	Data 3
1st try	2941	9148	138193
2nd try	2932	8279	132556
3rd try	2879	8205	132136

The result is correct!

Outside sort: quicksort + insertion sort + median of three + same elements together

Inside sort: quicksort + insertion sort + median of three + same elements together

	Data 1	Data 2	Data 3
1st try	3008	8305	130798
2nd try	2888	8296	130856
3rd try	2897	8376	130731

The result is NOT correct!

Improvements

- Choose more elements to compare so that get the number that more closer to the real median.
- We may want to try more pivots.