**Program Structures & Algorithms**

**Spring 2022**

**Assignment No. 4**

Name: Chenxu Zhao

(NUID): 001584599

* **Task**

Please see the presentation on *Assignment on Parallel Sorting* under the *Exams. etc.*module.

Your task is to implement a parallel sorting algorithm such that each partition of the array is sorted in parallel. You will consider two different schemes for deciding whether to sort in parallel.

1. A cutoff (defaults to, say, 1000) which you will update according to the first argument in the command line when running. It's your job to experiment and come up with a good value for this cutoff. If there are fewer elements to sort than the cutoff, then you should use the system sort instead.
2. Recursion depth or the number of available threads. Using this determination, you might decide on an ideal number (*t*) of separate threads (stick to powers of 2) and arrange for that number of partitions to be parallelized (by preventing recursion after the depth of *lg t* is reached).
3. An appropriate combination of these.

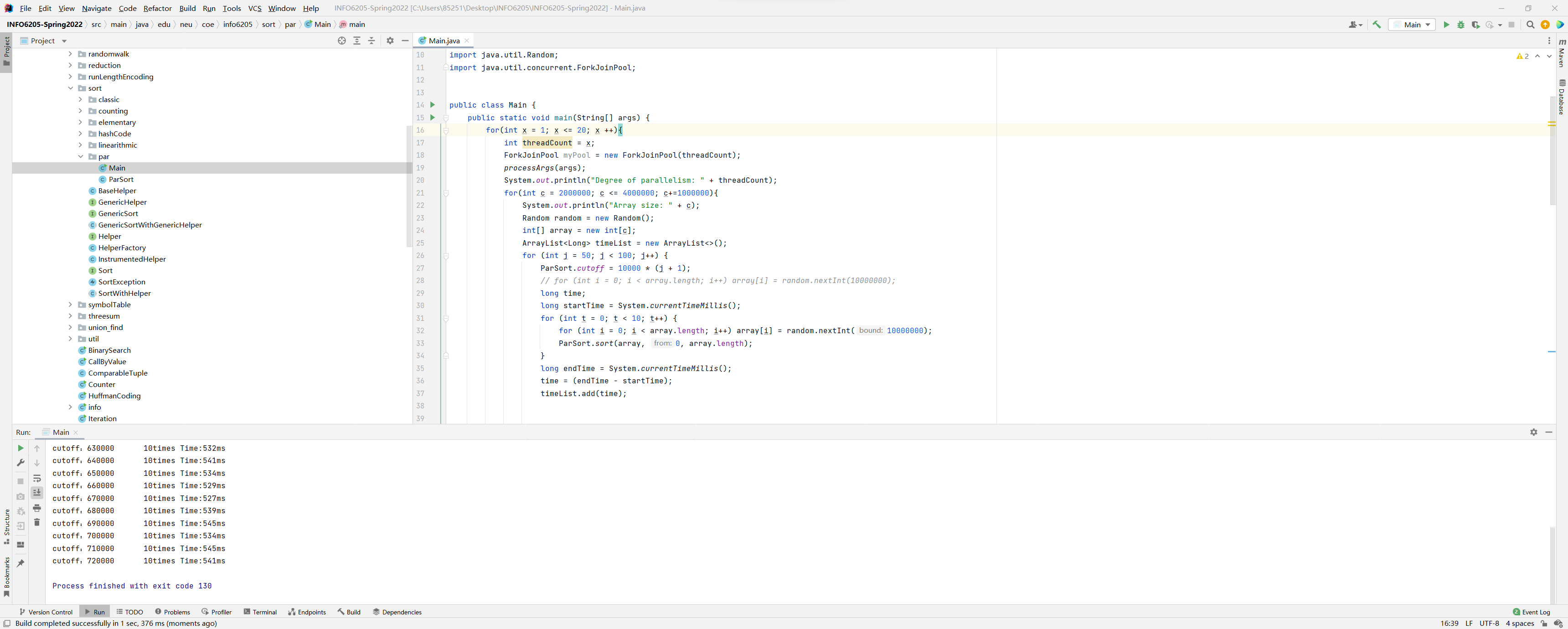
There is a *Main* class and the *ParSort* class in the *sort.par* package of the INFO6205 repository. The *Main* class can be used as is but the *ParSort* class needs to be implemented where you see "TODO..." [it turns out that these TODOs are already implemented].

Unless you have a good reason not to, you should just go along with the Java8-style future implementations provided for you in the class repository.

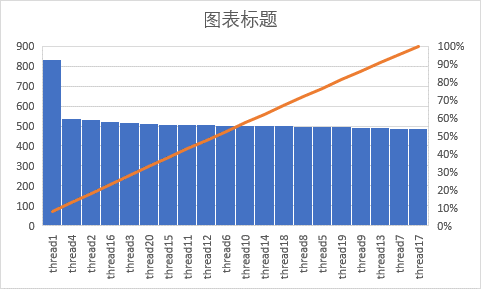
You must prepare a report that shows the results of your experiments and draws a conclusion (or more) about the efficacy of this method of parallelizing sort. Your experiments should involve sorting arrays of sufficient size for the parallel sort to make a difference. You should run with many different array sizes (they must be sufficiently large to make parallel sorting worthwhile, obviously) and different cutoff schemes.

Good luck and enjoy.

* **Output screenshot**

****

* **Relationship Conclusion**
* As far as this sorting algorithm is concerned. Parallelism can speed up the calculation, according to my computer records, 17 threads make the time shortest. In the array of 3000000, there is a suddenly rising in my records after the cutoff of 750000, but the overall situation is the same.
* **Evidence / Graph**



* **Unit tests result**

**1-20 threads in the same array size which is 2000000**

Degree of parallelism: 1

cutoff：510000 10times Time:833ms

cutoff：520000 10times Time:542ms

cutoff：530000 10times Time:525ms

cutoff：540000 10times Time:521ms

cutoff：550000 10times Time:534ms

cutoff：560000 10times Time:534ms

cutoff：570000 10times Time:523ms

cutoff：580000 10times Time:543ms

cutoff：590000 10times Time:536ms

cutoff：600000 10times Time:557ms

cutoff：610000 10times Time:545ms

cutoff：620000 10times Time:551ms

cutoff：630000 10times Time:538ms

cutoff：640000 10times Time:546ms

cutoff：650000 10times Time:518ms

cutoff：660000 10times Time:553ms

cutoff：670000 10times Time:560ms

cutoff：680000 10times Time:568ms

cutoff：690000 10times Time:537ms

cutoff：700000 10times Time:533ms

cutoff：710000 10times Time:549ms

cutoff：720000 10times Time:554ms

cutoff：730000 10times Time:528ms

cutoff：740000 10times Time:522ms

cutoff：750000 10times Time:540ms

cutoff：760000 10times Time:527ms

cutoff：770000 10times Time:563ms

cutoff：780000 10times Time:543ms

cutoff：790000 10times Time:533ms

cutoff：800000 10times Time:547ms

cutoff：810000 10times Time:548ms

cutoff：820000 10times Time:554ms

cutoff：830000 10times Time:559ms

cutoff：840000 10times Time:534ms

cutoff：850000 10times Time:550ms

cutoff：860000 10times Time:551ms

cutoff：870000 10times Time:529ms

cutoff：880000 10times Time:538ms

cutoff：890000 10times Time:525ms

cutoff：900000 10times Time:542ms

cutoff：910000 10times Time:562ms

cutoff：920000 10times Time:549ms

cutoff：930000 10times Time:540ms

cutoff：940000 10times Time:523ms

cutoff：950000 10times Time:530ms

cutoff：960000 10times Time:546ms

cutoff：970000 10times Time:539ms

cutoff：980000 10times Time:543ms

cutoff：990000 10times Time:522ms

cutoff：1000000 10times Time:526ms

Degree of parallelism: 2

cutoff：510000 10times Time:531ms

cutoff：520000 10times Time:516ms

cutoff：530000 10times Time:520ms

cutoff：540000 10times Time:523ms

cutoff：550000 10times Time:543ms

cutoff：560000 10times Time:531ms

cutoff：570000 10times Time:549ms

cutoff：580000 10times Time:527ms

cutoff：590000 10times Time:530ms

cutoff：600000 10times Time:527ms

cutoff：610000 10times Time:522ms

cutoff：620000 10times Time:538ms

cutoff：630000 10times Time:517ms

cutoff：640000 10times Time:542ms

cutoff：650000 10times Time:521ms

cutoff：660000 10times Time:533ms

cutoff：670000 10times Time:534ms

cutoff：680000 10times Time:544ms

cutoff：690000 10times Time:561ms

cutoff：700000 10times Time:569ms

cutoff：710000 10times Time:549ms

cutoff：720000 10times Time:554ms

cutoff：730000 10times Time:550ms

cutoff：740000 10times Time:560ms

cutoff：750000 10times Time:574ms

cutoff：760000 10times Time:548ms

cutoff：770000 10times Time:534ms

cutoff：780000 10times Time:532ms

cutoff：790000 10times Time:534ms

cutoff：800000 10times Time:551ms

cutoff：810000 10times Time:565ms

cutoff：820000 10times Time:537ms

cutoff：830000 10times Time:536ms

cutoff：840000 10times Time:542ms

cutoff：850000 10times Time:540ms

cutoff：860000 10times Time:538ms

cutoff：870000 10times Time:524ms

cutoff：880000 10times Time:545ms

cutoff：890000 10times Time:583ms

cutoff：900000 10times Time:600ms

cutoff：910000 10times Time:633ms

cutoff：920000 10times Time:653ms

cutoff：930000 10times Time:640ms

cutoff：940000 10times Time:591ms

cutoff：950000 10times Time:526ms

cutoff：960000 10times Time:515ms

cutoff：970000 10times Time:528ms

cutoff：980000 10times Time:528ms

cutoff：990000 10times Time:537ms

cutoff：1000000 10times Time:539ms

Degree of parallelism: 3

cutoff：510000 10times Time:520ms

cutoff：520000 10times Time:525ms

cutoff：530000 10times Time:510ms

cutoff：540000 10times Time:550ms

cutoff：550000 10times Time:551ms

cutoff：560000 10times Time:524ms

cutoff：570000 10times Time:544ms

cutoff：580000 10times Time:544ms

cutoff：590000 10times Time:532ms

cutoff：600000 10times Time:530ms

cutoff：610000 10times Time:542ms

cutoff：620000 10times Time:526ms

cutoff：630000 10times Time:558ms

cutoff：640000 10times Time:562ms

cutoff：650000 10times Time:545ms

cutoff：660000 10times Time:531ms

cutoff：670000 10times Time:540ms

cutoff：680000 10times Time:547ms

cutoff：690000 10times Time:549ms

cutoff：700000 10times Time:515ms

cutoff：710000 10times Time:526ms

cutoff：720000 10times Time:545ms

cutoff：730000 10times Time:524ms

cutoff：740000 10times Time:526ms

cutoff：750000 10times Time:526ms

cutoff：760000 10times Time:556ms

cutoff：770000 10times Time:531ms

cutoff：780000 10times Time:543ms

cutoff：790000 10times Time:554ms

cutoff：800000 10times Time:526ms

cutoff：810000 10times Time:520ms

cutoff：820000 10times Time:532ms

cutoff：830000 10times Time:536ms

cutoff：840000 10times Time:524ms

cutoff：850000 10times Time:533ms

cutoff：860000 10times Time:530ms

cutoff：870000 10times Time:527ms

cutoff：880000 10times Time:557ms

cutoff：890000 10times Time:549ms

cutoff：900000 10times Time:549ms

cutoff：910000 10times Time:534ms

cutoff：920000 10times Time:527ms

cutoff：930000 10times Time:581ms

cutoff：940000 10times Time:557ms

cutoff：950000 10times Time:547ms

cutoff：960000 10times Time:576ms

cutoff：970000 10times Time:527ms

cutoff：980000 10times Time:518ms

cutoff：990000 10times Time:521ms

cutoff：1000000 10times Time:529ms

Degree of parallelism: 4

cutoff：510000 10times Time:537ms

cutoff：520000 10times Time:515ms

cutoff：530000 10times Time:520ms

cutoff：540000 10times Time:532ms

cutoff：550000 10times Time:531ms

cutoff：560000 10times Time:542ms

cutoff：570000 10times Time:534ms

cutoff：580000 10times Time:522ms

cutoff：590000 10times Time:530ms

cutoff：600000 10times Time:537ms

cutoff：610000 10times Time:516ms

cutoff：620000 10times Time:539ms

cutoff：630000 10times Time:546ms

cutoff：640000 10times Time:523ms

cutoff：650000 10times Time:528ms

cutoff：660000 10times Time:526ms

cutoff：670000 10times Time:535ms

cutoff：680000 10times Time:512ms

cutoff：690000 10times Time:524ms

cutoff：700000 10times Time:523ms

cutoff：710000 10times Time:528ms

cutoff：720000 10times Time:553ms

cutoff：730000 10times Time:541ms

cutoff：740000 10times Time:513ms

cutoff：750000 10times Time:533ms

cutoff：760000 10times Time:522ms

cutoff：770000 10times Time:532ms

cutoff：780000 10times Time:519ms

cutoff：790000 10times Time:513ms

cutoff：800000 10times Time:516ms

cutoff：810000 10times Time:526ms

cutoff：820000 10times Time:550ms

cutoff：830000 10times Time:550ms

cutoff：840000 10times Time:545ms

cutoff：850000 10times Time:530ms

cutoff：860000 10times Time:518ms

cutoff：870000 10times Time:511ms

cutoff：880000 10times Time:520ms

cutoff：890000 10times Time:491ms

cutoff：900000 10times Time:504ms

cutoff：910000 10times Time:501ms

cutoff：920000 10times Time:523ms

cutoff：930000 10times Time:526ms

cutoff：940000 10times Time:520ms

cutoff：950000 10times Time:499ms

cutoff：960000 10times Time:495ms

cutoff：970000 10times Time:514ms

cutoff：980000 10times Time:511ms

cutoff：990000 10times Time:496ms

cutoff：1000000 10times Time:500ms

Degree of parallelism: 5

cutoff：510000 10times Time:496ms

cutoff：520000 10times Time:494ms

cutoff：530000 10times Time:533ms

cutoff：540000 10times Time:515ms

cutoff：550000 10times Time:505ms

cutoff：560000 10times Time:534ms

cutoff：570000 10times Time:507ms

cutoff：580000 10times Time:497ms

cutoff：590000 10times Time:491ms

cutoff：600000 10times Time:495ms

cutoff：610000 10times Time:513ms

cutoff：620000 10times Time:518ms

cutoff：630000 10times Time:525ms

cutoff：640000 10times Time:499ms

cutoff：650000 10times Time:513ms

cutoff：660000 10times Time:492ms

cutoff：670000 10times Time:496ms

cutoff：680000 10times Time:493ms

cutoff：690000 10times Time:511ms

cutoff：700000 10times Time:528ms

cutoff：710000 10times Time:516ms

cutoff：720000 10times Time:503ms

cutoff：730000 10times Time:514ms

cutoff：740000 10times Time:497ms

cutoff：750000 10times Time:509ms

cutoff：760000 10times Time:506ms

cutoff：770000 10times Time:497ms

cutoff：780000 10times Time:499ms

cutoff：790000 10times Time:502ms

cutoff：800000 10times Time:487ms

cutoff：810000 10times Time:499ms

cutoff：820000 10times Time:491ms

cutoff：830000 10times Time:503ms

cutoff：840000 10times Time:527ms

cutoff：850000 10times Time:484ms

cutoff：860000 10times Time:502ms

cutoff：870000 10times Time:497ms

cutoff：880000 10times Time:507ms

cutoff：890000 10times Time:499ms

cutoff：900000 10times Time:502ms

cutoff：910000 10times Time:510ms

cutoff：920000 10times Time:502ms

cutoff：930000 10times Time:501ms

cutoff：940000 10times Time:519ms

cutoff：950000 10times Time:532ms

cutoff：960000 10times Time:519ms

cutoff：970000 10times Time:544ms

cutoff：980000 10times Time:515ms

cutoff：990000 10times Time:518ms

cutoff：1000000 10times Time:497ms

Degree of parallelism: 6

cutoff：510000 10times Time:505ms

cutoff：520000 10times Time:514ms

cutoff：530000 10times Time:527ms

cutoff：540000 10times Time:519ms

cutoff：550000 10times Time:516ms

cutoff：560000 10times Time:502ms

cutoff：570000 10times Time:519ms

cutoff：580000 10times Time:518ms

cutoff：590000 10times Time:531ms

cutoff：600000 10times Time:505ms

cutoff：610000 10times Time:509ms

cutoff：620000 10times Time:507ms

cutoff：630000 10times Time:533ms

cutoff：640000 10times Time:524ms

cutoff：650000 10times Time:536ms

cutoff：660000 10times Time:493ms

cutoff：670000 10times Time:507ms

cutoff：680000 10times Time:514ms

cutoff：690000 10times Time:504ms

cutoff：700000 10times Time:514ms

cutoff：710000 10times Time:509ms

cutoff：720000 10times Time:510ms

cutoff：730000 10times Time:508ms

cutoff：740000 10times Time:515ms

cutoff：750000 10times Time:506ms

cutoff：760000 10times Time:504ms

cutoff：770000 10times Time:512ms

cutoff：780000 10times Time:493ms

cutoff：790000 10times Time:512ms

cutoff：800000 10times Time:500ms

cutoff：810000 10times Time:514ms

cutoff：820000 10times Time:521ms

cutoff：830000 10times Time:494ms

cutoff：840000 10times Time:504ms

cutoff：850000 10times Time:517ms

cutoff：860000 10times Time:508ms

cutoff：870000 10times Time:481ms

cutoff：880000 10times Time:515ms

cutoff：890000 10times Time:500ms

cutoff：900000 10times Time:492ms

cutoff：910000 10times Time:522ms

cutoff：920000 10times Time:500ms

cutoff：930000 10times Time:502ms

cutoff：940000 10times Time:511ms

cutoff：950000 10times Time:518ms

cutoff：960000 10times Time:516ms

cutoff：970000 10times Time:501ms

cutoff：980000 10times Time:500ms

cutoff：990000 10times Time:511ms

cutoff：1000000 10times Time:497ms

Degree of parallelism: 7

cutoff：510000 10times Time:488ms

cutoff：520000 10times Time:505ms

cutoff：530000 10times Time:523ms

cutoff：540000 10times Time:498ms

cutoff：550000 10times Time:519ms

cutoff：560000 10times Time:515ms

cutoff：570000 10times Time:503ms

cutoff：580000 10times Time:498ms

cutoff：590000 10times Time:508ms

cutoff：600000 10times Time:516ms

cutoff：610000 10times Time:499ms

cutoff：620000 10times Time:502ms

cutoff：630000 10times Time:513ms

cutoff：640000 10times Time:508ms

cutoff：650000 10times Time:497ms

cutoff：660000 10times Time:505ms

cutoff：670000 10times Time:511ms

cutoff：680000 10times Time:498ms

cutoff：690000 10times Time:511ms

cutoff：700000 10times Time:525ms

cutoff：710000 10times Time:497ms

cutoff：720000 10times Time:507ms

cutoff：730000 10times Time:486ms

cutoff：740000 10times Time:506ms

cutoff：750000 10times Time:500ms

cutoff：760000 10times Time:511ms

cutoff：770000 10times Time:501ms

cutoff：780000 10times Time:508ms

cutoff：790000 10times Time:498ms

cutoff：800000 10times Time:505ms

cutoff：810000 10times Time:495ms

cutoff：820000 10times Time:509ms

cutoff：830000 10times Time:506ms

cutoff：840000 10times Time:497ms

cutoff：850000 10times Time:507ms

cutoff：860000 10times Time:512ms

cutoff：870000 10times Time:492ms

cutoff：880000 10times Time:498ms

cutoff：890000 10times Time:493ms

cutoff：900000 10times Time:496ms

cutoff：910000 10times Time:517ms

cutoff：920000 10times Time:526ms

cutoff：930000 10times Time:495ms

cutoff：940000 10times Time:511ms

cutoff：950000 10times Time:487ms

cutoff：960000 10times Time:497ms

cutoff：970000 10times Time:502ms

cutoff：980000 10times Time:495ms

cutoff：990000 10times Time:489ms

cutoff：1000000 10times Time:502ms

Degree of parallelism: 8

cutoff：510000 10times Time:497ms

cutoff：520000 10times Time:490ms

cutoff：530000 10times Time:484ms

cutoff：540000 10times Time:489ms

cutoff：550000 10times Time:510ms

cutoff：560000 10times Time:504ms

cutoff：570000 10times Time:488ms

cutoff：580000 10times Time:506ms

cutoff：590000 10times Time:488ms

cutoff：600000 10times Time:485ms

cutoff：610000 10times Time:505ms

cutoff：620000 10times Time:504ms

cutoff：630000 10times Time:503ms

cutoff：640000 10times Time:505ms

cutoff：650000 10times Time:497ms

cutoff：660000 10times Time:500ms

cutoff：670000 10times Time:514ms

cutoff：680000 10times Time:543ms

cutoff：690000 10times Time:499ms

cutoff：700000 10times Time:506ms

cutoff：710000 10times Time:520ms

cutoff：720000 10times Time:519ms

cutoff：730000 10times Time:500ms

cutoff：740000 10times Time:491ms

cutoff：750000 10times Time:507ms

cutoff：760000 10times Time:507ms

cutoff：770000 10times Time:489ms

cutoff：780000 10times Time:518ms

cutoff：790000 10times Time:494ms

cutoff：800000 10times Time:514ms

cutoff：810000 10times Time:514ms

cutoff：820000 10times Time:536ms

cutoff：830000 10times Time:498ms

cutoff：840000 10times Time:511ms

cutoff：850000 10times Time:494ms

cutoff：860000 10times Time:491ms

cutoff：870000 10times Time:525ms

cutoff：880000 10times Time:526ms

cutoff：890000 10times Time:518ms

cutoff：900000 10times Time:500ms

cutoff：910000 10times Time:495ms

cutoff：920000 10times Time:529ms

cutoff：930000 10times Time:515ms

cutoff：940000 10times Time:505ms

cutoff：950000 10times Time:502ms

cutoff：960000 10times Time:501ms

cutoff：970000 10times Time:498ms

cutoff：980000 10times Time:509ms

cutoff：990000 10times Time:500ms

cutoff：1000000 10times Time:493ms

Degree of parallelism: 9

cutoff：510000 10times Time:493ms

cutoff：520000 10times Time:493ms

cutoff：530000 10times Time:513ms

cutoff：540000 10times Time:510ms

cutoff：550000 10times Time:492ms

cutoff：560000 10times Time:499ms

cutoff：570000 10times Time:508ms

cutoff：580000 10times Time:503ms

cutoff：590000 10times Time:519ms

cutoff：600000 10times Time:520ms

cutoff：610000 10times Time:502ms

cutoff：620000 10times Time:501ms

cutoff：630000 10times Time:505ms

cutoff：640000 10times Time:491ms

cutoff：650000 10times Time:503ms

cutoff：660000 10times Time:521ms

cutoff：670000 10times Time:520ms

cutoff：680000 10times Time:518ms

cutoff：690000 10times Time:508ms

cutoff：700000 10times Time:512ms

cutoff：710000 10times Time:509ms

cutoff：720000 10times Time:494ms

cutoff：730000 10times Time:505ms

cutoff：740000 10times Time:508ms

cutoff：750000 10times Time:489ms

cutoff：760000 10times Time:503ms

cutoff：770000 10times Time:487ms

cutoff：780000 10times Time:499ms

cutoff：790000 10times Time:529ms

cutoff：800000 10times Time:516ms

cutoff：810000 10times Time:498ms

cutoff：820000 10times Time:513ms

cutoff：830000 10times Time:528ms

cutoff：840000 10times Time:505ms

cutoff：850000 10times Time:495ms

cutoff：860000 10times Time:514ms

cutoff：870000 10times Time:511ms

cutoff：880000 10times Time:501ms

cutoff：890000 10times Time:493ms

cutoff：900000 10times Time:502ms

cutoff：910000 10times Time:494ms

cutoff：920000 10times Time:498ms

cutoff：930000 10times Time:513ms

cutoff：940000 10times Time:519ms

cutoff：950000 10times Time:496ms

cutoff：960000 10times Time:507ms

cutoff：970000 10times Time:495ms

cutoff：980000 10times Time:522ms

cutoff：990000 10times Time:516ms

cutoff：1000000 10times Time:508ms

Degree of parallelism: 10

cutoff：510000 10times Time:503ms

cutoff：520000 10times Time:507ms

cutoff：530000 10times Time:504ms

cutoff：540000 10times Time:492ms

cutoff：550000 10times Time:501ms

cutoff：560000 10times Time:507ms

cutoff：570000 10times Time:519ms

cutoff：580000 10times Time:495ms

cutoff：590000 10times Time:498ms

cutoff：600000 10times Time:511ms

cutoff：610000 10times Time:511ms

cutoff：620000 10times Time:498ms

cutoff：630000 10times Time:522ms

cutoff：640000 10times Time:511ms

cutoff：650000 10times Time:511ms

cutoff：660000 10times Time:490ms

cutoff：670000 10times Time:505ms

cutoff：680000 10times Time:508ms

cutoff：690000 10times Time:503ms

cutoff：700000 10times Time:501ms

cutoff：710000 10times Time:523ms

cutoff：720000 10times Time:497ms

cutoff：730000 10times Time:514ms

cutoff：740000 10times Time:521ms

cutoff：750000 10times Time:510ms

cutoff：760000 10times Time:509ms

cutoff：770000 10times Time:505ms

cutoff：780000 10times Time:508ms

cutoff：790000 10times Time:513ms

cutoff：800000 10times Time:505ms

cutoff：810000 10times Time:500ms

cutoff：820000 10times Time:504ms

cutoff：830000 10times Time:505ms

cutoff：840000 10times Time:526ms

cutoff：850000 10times Time:496ms

cutoff：860000 10times Time:492ms

cutoff：870000 10times Time:507ms

cutoff：880000 10times Time:516ms

cutoff：890000 10times Time:507ms

cutoff：900000 10times Time:519ms

cutoff：910000 10times Time:508ms

cutoff：920000 10times Time:505ms

cutoff：930000 10times Time:504ms

cutoff：940000 10times Time:508ms

cutoff：950000 10times Time:509ms

cutoff：960000 10times Time:516ms

cutoff：970000 10times Time:505ms

cutoff：980000 10times Time:525ms

cutoff：990000 10times Time:512ms

cutoff：1000000 10times Time:527ms

Degree of parallelism: 11

cutoff：510000 10times Time:507ms

cutoff：520000 10times Time:511ms

cutoff：530000 10times Time:514ms

cutoff：540000 10times Time:535ms

cutoff：550000 10times Time:520ms

cutoff：560000 10times Time:517ms

cutoff：570000 10times Time:492ms

cutoff：580000 10times Time:504ms

cutoff：590000 10times Time:514ms

cutoff：600000 10times Time:544ms

cutoff：610000 10times Time:496ms

cutoff：620000 10times Time:504ms

cutoff：630000 10times Time:528ms

cutoff：640000 10times Time:525ms

cutoff：650000 10times Time:518ms

cutoff：660000 10times Time:517ms

cutoff：670000 10times Time:488ms

cutoff：680000 10times Time:494ms

cutoff：690000 10times Time:516ms

cutoff：700000 10times Time:502ms

cutoff：710000 10times Time:509ms

cutoff：720000 10times Time:531ms

cutoff：730000 10times Time:524ms

cutoff：740000 10times Time:495ms

cutoff：750000 10times Time:503ms

cutoff：760000 10times Time:499ms

cutoff：770000 10times Time:501ms

cutoff：780000 10times Time:508ms

cutoff：790000 10times Time:498ms

cutoff：800000 10times Time:492ms

cutoff：810000 10times Time:496ms

cutoff：820000 10times Time:508ms

cutoff：830000 10times Time:500ms

cutoff：840000 10times Time:520ms

cutoff：850000 10times Time:512ms

cutoff：860000 10times Time:517ms

cutoff：870000 10times Time:498ms

cutoff：880000 10times Time:502ms

cutoff：890000 10times Time:512ms

cutoff：900000 10times Time:509ms

cutoff：910000 10times Time:501ms

cutoff：920000 10times Time:496ms

cutoff：930000 10times Time:499ms

cutoff：940000 10times Time:489ms

cutoff：950000 10times Time:503ms

cutoff：960000 10times Time:499ms

cutoff：970000 10times Time:510ms

cutoff：980000 10times Time:491ms

cutoff：990000 10times Time:505ms

cutoff：1000000 10times Time:498ms

Degree of parallelism: 12

cutoff：510000 10times Time:506ms

cutoff：520000 10times Time:513ms

cutoff：530000 10times Time:509ms

cutoff：540000 10times Time:506ms

cutoff：550000 10times Time:518ms

cutoff：560000 10times Time:512ms

cutoff：570000 10times Time:500ms

cutoff：580000 10times Time:495ms

cutoff：590000 10times Time:505ms

cutoff：600000 10times Time:497ms

cutoff：610000 10times Time:504ms

cutoff：620000 10times Time:503ms

cutoff：630000 10times Time:501ms

cutoff：640000 10times Time:496ms

cutoff：650000 10times Time:497ms

cutoff：660000 10times Time:523ms

cutoff：670000 10times Time:512ms

cutoff：680000 10times Time:503ms

cutoff：690000 10times Time:509ms

cutoff：700000 10times Time:490ms

cutoff：710000 10times Time:516ms

cutoff：720000 10times Time:503ms

cutoff：730000 10times Time:509ms

cutoff：740000 10times Time:496ms

cutoff：750000 10times Time:519ms

cutoff：760000 10times Time:509ms

cutoff：770000 10times Time:499ms

cutoff：780000 10times Time:493ms

cutoff：790000 10times Time:501ms

cutoff：800000 10times Time:495ms

cutoff：810000 10times Time:500ms

cutoff：820000 10times Time:510ms

cutoff：830000 10times Time:498ms

cutoff：840000 10times Time:483ms

cutoff：850000 10times Time:504ms

cutoff：860000 10times Time:495ms

cutoff：870000 10times Time:496ms

cutoff：880000 10times Time:491ms

cutoff：890000 10times Time:520ms

cutoff：900000 10times Time:512ms

cutoff：910000 10times Time:497ms

cutoff：920000 10times Time:492ms

cutoff：930000 10times Time:494ms

cutoff：940000 10times Time:510ms

cutoff：950000 10times Time:495ms

cutoff：960000 10times Time:505ms

cutoff：970000 10times Time:499ms

cutoff：980000 10times Time:520ms

cutoff：990000 10times Time:494ms

cutoff：1000000 10times Time:503ms

Degree of parallelism: 13

cutoff：510000 10times Time:492ms

cutoff：520000 10times Time:497ms

cutoff：530000 10times Time:522ms

cutoff：540000 10times Time:516ms

cutoff：550000 10times Time:497ms

cutoff：560000 10times Time:493ms

cutoff：570000 10times Time:488ms

cutoff：580000 10times Time:501ms

cutoff：590000 10times Time:500ms

cutoff：600000 10times Time:491ms

cutoff：610000 10times Time:510ms

cutoff：620000 10times Time:500ms

cutoff：630000 10times Time:495ms

cutoff：640000 10times Time:502ms

cutoff：650000 10times Time:506ms

cutoff：660000 10times Time:508ms

cutoff：670000 10times Time:526ms

cutoff：680000 10times Time:496ms

cutoff：690000 10times Time:511ms

cutoff：700000 10times Time:499ms

cutoff：710000 10times Time:505ms

cutoff：720000 10times Time:503ms

cutoff：730000 10times Time:512ms

cutoff：740000 10times Time:499ms

cutoff：750000 10times Time:503ms

cutoff：760000 10times Time:492ms

cutoff：770000 10times Time:490ms

cutoff：780000 10times Time:513ms

cutoff：790000 10times Time:498ms

cutoff：800000 10times Time:500ms

cutoff：810000 10times Time:532ms

cutoff：820000 10times Time:488ms

cutoff：830000 10times Time:500ms

cutoff：840000 10times Time:522ms

cutoff：850000 10times Time:511ms

cutoff：860000 10times Time:488ms

cutoff：870000 10times Time:500ms

cutoff：880000 10times Time:500ms

cutoff：890000 10times Time:521ms

cutoff：900000 10times Time:498ms

cutoff：910000 10times Time:513ms

cutoff：920000 10times Time:515ms

cutoff：930000 10times Time:499ms

cutoff：940000 10times Time:492ms

cutoff：950000 10times Time:511ms

cutoff：960000 10times Time:497ms

cutoff：970000 10times Time:497ms

cutoff：980000 10times Time:499ms

cutoff：990000 10times Time:496ms

cutoff：1000000 10times Time:499ms

Degree of parallelism: 14

cutoff：510000 10times Time:502ms

cutoff：520000 10times Time:503ms

cutoff：530000 10times Time:509ms

cutoff：540000 10times Time:505ms

cutoff：550000 10times Time:513ms

cutoff：560000 10times Time:484ms

cutoff：570000 10times Time:503ms

cutoff：580000 10times Time:500ms

cutoff：590000 10times Time:517ms

cutoff：600000 10times Time:498ms

cutoff：610000 10times Time:499ms

cutoff：620000 10times Time:499ms

cutoff：630000 10times Time:512ms

cutoff：640000 10times Time:525ms

cutoff：650000 10times Time:522ms

cutoff：660000 10times Time:519ms

cutoff：670000 10times Time:521ms

cutoff：680000 10times Time:498ms

cutoff：690000 10times Time:501ms

cutoff：700000 10times Time:512ms

cutoff：710000 10times Time:509ms

cutoff：720000 10times Time:512ms

cutoff：730000 10times Time:498ms

cutoff：740000 10times Time:488ms

cutoff：750000 10times Time:504ms

cutoff：760000 10times Time:521ms

cutoff：770000 10times Time:521ms

cutoff：780000 10times Time:509ms

cutoff：790000 10times Time:502ms

cutoff：800000 10times Time:527ms

cutoff：810000 10times Time:525ms

cutoff：820000 10times Time:500ms

cutoff：830000 10times Time:494ms

cutoff：840000 10times Time:517ms

cutoff：850000 10times Time:502ms

cutoff：860000 10times Time:492ms

cutoff：870000 10times Time:522ms

cutoff：880000 10times Time:492ms

cutoff：890000 10times Time:488ms

cutoff：900000 10times Time:504ms

cutoff：910000 10times Time:499ms

cutoff：920000 10times Time:508ms

cutoff：930000 10times Time:508ms

cutoff：940000 10times Time:494ms

cutoff：950000 10times Time:514ms

cutoff：960000 10times Time:503ms

cutoff：970000 10times Time:499ms

cutoff：980000 10times Time:504ms

cutoff：990000 10times Time:507ms

cutoff：1000000 10times Time:510ms

Degree of parallelism: 15

cutoff：510000 10times Time:508ms

cutoff：520000 10times Time:499ms

cutoff：530000 10times Time:494ms

cutoff：540000 10times Time:528ms

cutoff：550000 10times Time:495ms

cutoff：560000 10times Time:499ms

cutoff：570000 10times Time:501ms

cutoff：580000 10times Time:489ms

cutoff：590000 10times Time:503ms

cutoff：600000 10times Time:502ms

cutoff：610000 10times Time:503ms

cutoff：620000 10times Time:512ms

cutoff：630000 10times Time:494ms

cutoff：640000 10times Time:510ms

cutoff：650000 10times Time:528ms

cutoff：660000 10times Time:504ms

cutoff：670000 10times Time:488ms

cutoff：680000 10times Time:499ms

cutoff：690000 10times Time:498ms

cutoff：700000 10times Time:522ms

cutoff：710000 10times Time:502ms

cutoff：720000 10times Time:521ms

cutoff：730000 10times Time:493ms

cutoff：740000 10times Time:487ms

cutoff：750000 10times Time:491ms

cutoff：760000 10times Time:501ms

cutoff：770000 10times Time:511ms

cutoff：780000 10times Time:519ms

cutoff：790000 10times Time:510ms

cutoff：800000 10times Time:493ms

cutoff：810000 10times Time:507ms

cutoff：820000 10times Time:513ms

cutoff：830000 10times Time:497ms

cutoff：840000 10times Time:510ms

cutoff：850000 10times Time:491ms

cutoff：860000 10times Time:490ms

cutoff：870000 10times Time:521ms

cutoff：880000 10times Time:532ms

cutoff：890000 10times Time:527ms

cutoff：900000 10times Time:532ms

cutoff：910000 10times Time:528ms

cutoff：920000 10times Time:531ms

cutoff：930000 10times Time:531ms

cutoff：940000 10times Time:509ms

cutoff：950000 10times Time:506ms

cutoff：960000 10times Time:522ms

cutoff：970000 10times Time:512ms

cutoff：980000 10times Time:530ms

cutoff：990000 10times Time:522ms

cutoff：1000000 10times Time:509ms

Degree of parallelism: 16

cutoff：510000 10times Time:525ms

cutoff：520000 10times Time:520ms

cutoff：530000 10times Time:506ms

cutoff：540000 10times Time:517ms

cutoff：550000 10times Time:508ms

cutoff：560000 10times Time:498ms

cutoff：570000 10times Time:505ms

cutoff：580000 10times Time:501ms

cutoff：590000 10times Time:508ms

cutoff：600000 10times Time:512ms

cutoff：610000 10times Time:509ms

cutoff：620000 10times Time:534ms

cutoff：630000 10times Time:521ms

cutoff：640000 10times Time:497ms

cutoff：650000 10times Time:518ms

cutoff：660000 10times Time:509ms

cutoff：670000 10times Time:488ms

cutoff：680000 10times Time:511ms

cutoff：690000 10times Time:509ms

cutoff：700000 10times Time:492ms

cutoff：710000 10times Time:500ms

cutoff：720000 10times Time:502ms

cutoff：730000 10times Time:493ms

cutoff：740000 10times Time:506ms

cutoff：750000 10times Time:509ms

cutoff：760000 10times Time:506ms

cutoff：770000 10times Time:509ms

cutoff：780000 10times Time:517ms

cutoff：790000 10times Time:502ms

cutoff：800000 10times Time:503ms

cutoff：810000 10times Time:496ms

cutoff：820000 10times Time:502ms

cutoff：830000 10times Time:533ms

cutoff：840000 10times Time:497ms

cutoff：850000 10times Time:529ms

cutoff：860000 10times Time:488ms

cutoff：870000 10times Time:502ms

cutoff：880000 10times Time:500ms

cutoff：890000 10times Time:497ms

cutoff：900000 10times Time:535ms

cutoff：910000 10times Time:506ms

cutoff：920000 10times Time:513ms

cutoff：930000 10times Time:494ms

cutoff：940000 10times Time:503ms

cutoff：950000 10times Time:512ms

cutoff：960000 10times Time:526ms

cutoff：970000 10times Time:502ms

cutoff：980000 10times Time:499ms

cutoff：990000 10times Time:525ms

cutoff：1000000 10times Time:514ms

Degree of parallelism: 17

cutoff：510000 10times Time:486ms

cutoff：520000 10times Time:503ms

cutoff：530000 10times Time:528ms

cutoff：540000 10times Time:540ms

cutoff：550000 10times Time:499ms

cutoff：560000 10times Time:511ms

cutoff：570000 10times Time:516ms

cutoff：580000 10times Time:481ms

cutoff：590000 10times Time:516ms

cutoff：600000 10times Time:505ms

cutoff：610000 10times Time:494ms

cutoff：620000 10times Time:525ms

cutoff：630000 10times Time:522ms

cutoff：640000 10times Time:502ms

cutoff：650000 10times Time:511ms

cutoff：660000 10times Time:501ms

cutoff：670000 10times Time:494ms

cutoff：680000 10times Time:534ms

cutoff：690000 10times Time:535ms

cutoff：700000 10times Time:495ms

cutoff：710000 10times Time:506ms

cutoff：720000 10times Time:492ms

cutoff：730000 10times Time:496ms

cutoff：740000 10times Time:510ms

cutoff：750000 10times Time:503ms

cutoff：760000 10times Time:498ms

cutoff：770000 10times Time:497ms

cutoff：780000 10times Time:495ms

cutoff：790000 10times Time:497ms

cutoff：800000 10times Time:494ms

cutoff：810000 10times Time:497ms

cutoff：820000 10times Time:499ms

cutoff：830000 10times Time:491ms

cutoff：840000 10times Time:494ms

cutoff：850000 10times Time:501ms

cutoff：860000 10times Time:489ms

cutoff：870000 10times Time:502ms

cutoff：880000 10times Time:497ms

cutoff：890000 10times Time:516ms

cutoff：900000 10times Time:510ms

cutoff：910000 10times Time:503ms

cutoff：920000 10times Time:510ms

cutoff：930000 10times Time:502ms

cutoff：940000 10times Time:503ms

cutoff：950000 10times Time:531ms

cutoff：960000 10times Time:523ms

cutoff：970000 10times Time:488ms

cutoff：980000 10times Time:488ms

cutoff：990000 10times Time:503ms

cutoff：1000000 10times Time:508ms

Degree of parallelism: 18

cutoff：510000 10times Time:502ms

cutoff：520000 10times Time:511ms

cutoff：530000 10times Time:502ms

cutoff：540000 10times Time:501ms

cutoff：550000 10times Time:490ms

cutoff：560000 10times Time:500ms

cutoff：570000 10times Time:499ms

cutoff：580000 10times Time:525ms

cutoff：590000 10times Time:515ms

cutoff：600000 10times Time:505ms

cutoff：610000 10times Time:519ms

cutoff：620000 10times Time:519ms

cutoff：630000 10times Time:527ms

cutoff：640000 10times Time:520ms

cutoff：650000 10times Time:505ms

cutoff：660000 10times Time:557ms

cutoff：670000 10times Time:537ms

cutoff：680000 10times Time:542ms

cutoff：690000 10times Time:514ms

cutoff：700000 10times Time:494ms

cutoff：710000 10times Time:524ms

cutoff：720000 10times Time:512ms

cutoff：730000 10times Time:537ms

cutoff：740000 10times Time:523ms

cutoff：750000 10times Time:501ms

cutoff：760000 10times Time:506ms

cutoff：770000 10times Time:518ms

cutoff：780000 10times Time:490ms

cutoff：790000 10times Time:530ms

cutoff：800000 10times Time:527ms

cutoff：810000 10times Time:534ms

cutoff：820000 10times Time:494ms

cutoff：830000 10times Time:509ms

cutoff：840000 10times Time:507ms

cutoff：850000 10times Time:515ms

cutoff：860000 10times Time:499ms

cutoff：870000 10times Time:516ms

cutoff：880000 10times Time:508ms

cutoff：890000 10times Time:546ms

cutoff：900000 10times Time:532ms

cutoff：910000 10times Time:524ms

cutoff：920000 10times Time:508ms

cutoff：930000 10times Time:513ms

cutoff：940000 10times Time:504ms

cutoff：950000 10times Time:505ms

cutoff：960000 10times Time:501ms

cutoff：970000 10times Time:509ms

cutoff：980000 10times Time:497ms

cutoff：990000 10times Time:515ms

cutoff：1000000 10times Time:512ms

Degree of parallelism: 19

cutoff：510000 10times Time:496ms

cutoff：520000 10times Time:514ms

cutoff：530000 10times Time:510ms

cutoff：540000 10times Time:495ms

cutoff：550000 10times Time:501ms

cutoff：560000 10times Time:495ms

cutoff：570000 10times Time:507ms

cutoff：580000 10times Time:507ms

cutoff：590000 10times Time:501ms

cutoff：600000 10times Time:519ms

cutoff：610000 10times Time:509ms

cutoff：620000 10times Time:508ms

cutoff：630000 10times Time:508ms

cutoff：640000 10times Time:505ms

cutoff：650000 10times Time:499ms

cutoff：660000 10times Time:505ms

cutoff：670000 10times Time:499ms

cutoff：680000 10times Time:495ms

cutoff：690000 10times Time:515ms

cutoff：700000 10times Time:518ms

cutoff：710000 10times Time:501ms

cutoff：720000 10times Time:515ms

cutoff：730000 10times Time:508ms

cutoff：740000 10times Time:522ms

cutoff：750000 10times Time:511ms

cutoff：760000 10times Time:517ms

cutoff：770000 10times Time:513ms

cutoff：780000 10times Time:520ms

cutoff：790000 10times Time:510ms

cutoff：800000 10times Time:536ms

cutoff：810000 10times Time:511ms

cutoff：820000 10times Time:511ms

cutoff：830000 10times Time:496ms

cutoff：840000 10times Time:500ms

cutoff：850000 10times Time:512ms

cutoff：860000 10times Time:502ms

cutoff：870000 10times Time:524ms

cutoff：880000 10times Time:514ms

cutoff：890000 10times Time:505ms

cutoff：900000 10times Time:503ms

cutoff：910000 10times Time:513ms

cutoff：920000 10times Time:527ms

cutoff：930000 10times Time:500ms

cutoff：940000 10times Time:505ms

cutoff：950000 10times Time:501ms

cutoff：960000 10times Time:492ms

cutoff：970000 10times Time:505ms

cutoff：980000 10times Time:504ms

cutoff：990000 10times Time:510ms

cutoff：1000000 10times Time:498ms

Degree of parallelism: 20

cutoff：510000 10times Time:515ms

cutoff：520000 10times Time:521ms

cutoff：530000 10times Time:511ms

cutoff：540000 10times Time:500ms

cutoff：550000 10times Time:490ms

cutoff：560000 10times Time:509ms

cutoff：570000 10times Time:504ms

cutoff：580000 10times Time:491ms

cutoff：590000 10times Time:508ms

cutoff：600000 10times Time:505ms

cutoff：610000 10times Time:519ms

cutoff：620000 10times Time:493ms

cutoff：630000 10times Time:498ms

cutoff：640000 10times Time:507ms

cutoff：650000 10times Time:493ms

cutoff：660000 10times Time:495ms

cutoff：670000 10times Time:509ms

cutoff：680000 10times Time:492ms

cutoff：690000 10times Time:509ms

cutoff：700000 10times Time:504ms

cutoff：710000 10times Time:509ms

cutoff：720000 10times Time:499ms

cutoff：730000 10times Time:530ms

cutoff：740000 10times Time:500ms

cutoff：750000 10times Time:513ms

cutoff：760000 10times Time:510ms

cutoff：770000 10times Time:493ms

cutoff：780000 10times Time:506ms

cutoff：790000 10times Time:505ms

cutoff：800000 10times Time:505ms

cutoff：810000 10times Time:527ms

cutoff：820000 10times Time:499ms

cutoff：830000 10times Time:515ms

cutoff：840000 10times Time:502ms

cutoff：850000 10times Time:511ms

cutoff：860000 10times Time:501ms

cutoff：870000 10times Time:496ms

cutoff：880000 10times Time:505ms

cutoff：890000 10times Time:521ms

cutoff：900000 10times Time:506ms

cutoff：910000 10times Time:491ms

cutoff：920000 10times Time:519ms

cutoff：930000 10times Time:508ms

cutoff：940000 10times Time:496ms

cutoff：950000 10times Time:494ms

cutoff：960000 10times Time:507ms

cutoff：970000 10times Time:511ms

cutoff：980000 10times Time:497ms

cutoff：990000 10times Time:507ms

cutoff：1000000 10times Time:500ms

Process finished with exit code 0

array size in 2000000, 3000000, 4000000, default threads

Array size: 2000000

cutoff：510000 10times Time:819ms

cutoff：520000 10times Time:568ms

cutoff：530000 10times Time:565ms

cutoff：540000 10times Time:542ms

cutoff：550000 10times Time:550ms

cutoff：560000 10times Time:568ms

cutoff：570000 10times Time:530ms

cutoff：580000 10times Time:543ms

cutoff：590000 10times Time:556ms

cutoff：600000 10times Time:556ms

cutoff：610000 10times Time:557ms

cutoff：620000 10times Time:548ms

cutoff：630000 10times Time:538ms

cutoff：640000 10times Time:547ms

cutoff：650000 10times Time:547ms

cutoff：660000 10times Time:557ms

cutoff：670000 10times Time:542ms

cutoff：680000 10times Time:560ms

cutoff：690000 10times Time:549ms

cutoff：700000 10times Time:544ms

cutoff：710000 10times Time:556ms

cutoff：720000 10times Time:531ms

cutoff：730000 10times Time:546ms

cutoff：740000 10times Time:546ms

cutoff：750000 10times Time:548ms

cutoff：760000 10times Time:548ms

cutoff：770000 10times Time:557ms

cutoff：780000 10times Time:573ms

cutoff：790000 10times Time:582ms

cutoff：800000 10times Time:551ms

cutoff：810000 10times Time:552ms

cutoff：820000 10times Time:539ms

cutoff：830000 10times Time:557ms

cutoff：840000 10times Time:562ms

cutoff：850000 10times Time:541ms

cutoff：860000 10times Time:559ms

cutoff：870000 10times Time:543ms

cutoff：880000 10times Time:547ms

cutoff：890000 10times Time:542ms

cutoff：900000 10times Time:549ms

cutoff：910000 10times Time:535ms

cutoff：920000 10times Time:550ms

cutoff：930000 10times Time:547ms

cutoff：940000 10times Time:537ms

cutoff：950000 10times Time:545ms

cutoff：960000 10times Time:538ms

cutoff：970000 10times Time:542ms

cutoff：980000 10times Time:532ms

cutoff：990000 10times Time:549ms

cutoff：1000000 10times Time:536ms

Array size: 3000000

cutoff：510000 10times Time:738ms

cutoff：520000 10times Time:721ms

cutoff：530000 10times Time:722ms

cutoff：540000 10times Time:739ms

cutoff：550000 10times Time:725ms

cutoff：560000 10times Time:733ms

cutoff：570000 10times Time:727ms

cutoff：580000 10times Time:739ms

cutoff：590000 10times Time:742ms

cutoff：600000 10times Time:741ms

cutoff：610000 10times Time:721ms

cutoff：620000 10times Time:720ms

cutoff：630000 10times Time:743ms

cutoff：640000 10times Time:739ms

cutoff：650000 10times Time:727ms

cutoff：660000 10times Time:740ms

cutoff：670000 10times Time:737ms

cutoff：680000 10times Time:704ms

cutoff：690000 10times Time:693ms

cutoff：700000 10times Time:690ms

cutoff：710000 10times Time:686ms

cutoff：720000 10times Time:685ms

cutoff：730000 10times Time:681ms

cutoff：740000 10times Time:679ms

cutoff：750000 10times Time:692ms

cutoff：760000 10times Time:848ms

cutoff：770000 10times Time:790ms

cutoff：780000 10times Time:791ms

cutoff：790000 10times Time:784ms

cutoff：800000 10times Time:784ms

cutoff：810000 10times Time:798ms

cutoff：820000 10times Time:789ms

cutoff：830000 10times Time:811ms

cutoff：840000 10times Time:777ms

cutoff：850000 10times Time:810ms

cutoff：860000 10times Time:807ms

cutoff：870000 10times Time:785ms

cutoff：880000 10times Time:787ms

cutoff：890000 10times Time:766ms

cutoff：900000 10times Time:780ms

cutoff：910000 10times Time:773ms

cutoff：920000 10times Time:802ms

cutoff：930000 10times Time:781ms

cutoff：940000 10times Time:791ms

cutoff：950000 10times Time:792ms

cutoff：960000 10times Time:794ms

cutoff：970000 10times Time:783ms

cutoff：980000 10times Time:781ms

cutoff：990000 10times Time:794ms

cutoff：1000000 10times Time:788ms

Array size: 4000000

cutoff：510000 10times Time:903ms

cutoff：520000 10times Time:903ms

cutoff：530000 10times Time:913ms

cutoff：540000 10times Time:922ms

cutoff：550000 10times Time:936ms

cutoff：560000 10times Time:896ms

cutoff：570000 10times Time:931ms

cutoff：580000 10times Time:905ms

cutoff：590000 10times Time:910ms

cutoff：600000 10times Time:926ms

cutoff：610000 10times Time:904ms

cutoff：620000 10times Time:907ms

cutoff：630000 10times Time:892ms

cutoff：640000 10times Time:908ms

cutoff：650000 10times Time:904ms

cutoff：660000 10times Time:916ms

cutoff：670000 10times Time:911ms

cutoff：680000 10times Time:905ms

cutoff：690000 10times Time:896ms

cutoff：700000 10times Time:897ms

cutoff：710000 10times Time:900ms

cutoff：720000 10times Time:917ms

cutoff：730000 10times Time:914ms

cutoff：740000 10times Time:906ms

cutoff：750000 10times Time:915ms

cutoff：760000 10times Time:900ms

cutoff：770000 10times Time:902ms

cutoff：780000 10times Time:904ms

cutoff：790000 10times Time:913ms

cutoff：800000 10times Time:924ms

cutoff：810000 10times Time:902ms

cutoff：820000 10times Time:920ms

cutoff：830000 10times Time:915ms

cutoff：840000 10times Time:916ms

cutoff：850000 10times Time:903ms

cutoff：860000 10times Time:910ms

cutoff：870000 10times Time:913ms

cutoff：880000 10times Time:909ms

cutoff：890000 10times Time:925ms

cutoff：900000 10times Time:930ms

cutoff：910000 10times Time:923ms

cutoff：920000 10times Time:917ms

cutoff：930000 10times Time:898ms

cutoff：940000 10times Time:914ms

cutoff：950000 10times Time:914ms

cutoff：960000 10times Time:915ms

cutoff：970000 10times Time:933ms

cutoff：980000 10times Time:925ms

cutoff：990000 10times Time:899ms

cutoff：1000000 10times Time:934ms

Process finished with exit code 0