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Parallel Prefix Sum Write-Up

Testing Method

An array of five hundred million integers was created, with each entry assigned to the next int produce by a single java.util.Random instance. Three copies of this same array were then made. The three different implementation of prefixSum(int[] array) provided by ParallelPrefixSum, JDKParallelPrefixSum, and SerialPrefixSum were each passed a copy of the array. Each implementation's runtime was recorded using System.nanoTime(). This process was repeated thirty times, with a new Random creating a new array of five hundred million random integers each time. In order to verify correctness, and therefore ensure that all recorded times are the product of producing a correct result, the JDK implementation's result was compared to that of the other two implementations, in a separate test.

Results

The averaged times across all thirty iterations, in nanoseconds, are as follows:
ParallelPrefixSum time: 311569165
JDKParallelPrefixSum time: 300707240
SerialPrefixSum time: 332702290
Expressed relative to the time of serial implementation, ParallelPrefixSum took 0.936 times as long, while JDKParallelPrefixSum took 0.904 times as long. Both, therefore, were faster than the serial version for a very large array.