% A5 Lab Report

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% 11/1/2017

# Benchmarking the ArrayStrand implementation

## Show that ArrayStrand.cutAndSplice() is O(N)

It’s not difficult to show the time complexity is O(N) because of the information the default string output provides. It can be seen that when the splice length is doubled, the time it takes to recombine the splices roughly doubles, especially when the splice length is higher.

## Determine the largest power-of-two splice supported with 512M heap

Record your response here.

With a 512M heap, the largest power of two splice that’s supported is 215, or 32,768.

## Determine the largest power-of-two splice supported with 1024M heap

Record your response here.

With a 1024M heap, the largest power of two splice that’s supported is 217, or 131,072.

## Determine the largest power-of-two splice supported as heap doubles

Record your response here.

2048M outputs a splice length of 218, 4096M 219, and 8,192M 220. Therefore, the largest power-of-two splice supported is 2n+7, where 2n is the amount of memory available. The largest 2^n splice length supported by my 4GB memory laptop is 524,288.

# Verifying the LinkedStrand implementation

## Show that LinkedStrand.cutAndSplice() is O(1)

LinkedStrand: splice length 256 time 0.062 recombinant length 4,800,471

LinkedStrand: splice length 512 time 0.075 recombinant length 4,965,591

LinkedStrand: splice length 1,024 time 0.078 recombinant length 5,295,831

LinkedStrand: splice length 2,048 time 0.083 recombinant length 5,956,311

LinkedStrand: splice length 4,096 time 0.122 recombinant length 7,277,271

LinkedStrand: splice length 8,192 time 0.057 recombinant length 9,919,191

LinkedStrand: splice length 16,384 time 0.072 recombinant length 15,203,031

LinkedStrand: splice length 32,768 time 0.056 recombinant length 25,770,711

LinkedStrand: splice length 65,536 time 0.085 recombinant length 46,906,071

LinkedStrand: splice length 131,072 time 0.078 recombinant length 89,176,791

LinkedStrand: splice length 262,144 time 0.058 recombinant length 173,718,231

LinkedStrand: splice length 524,288 time 0.058 recombinant length 342,801,111

LinkedStrand: splice length 1,048,576 time 0.036 recombinant length 680,966,871

LinkedStrand: splice length 2,097,152 time 0.124 recombinant length 1,357,298,391

LinkedStrand: splice length 4,194,304 time 0.044 recombinant length 2,709,961,431

LinkedStrand: splice length 8,388,608 time 0.034 recombinant length 5,415,287,511

LinkedStrand: splice length 16,777,216 time 0.033 recombinant length 10,825,939,671

LinkedStrand: splice length 33,554,432 time 0.032 recombinant length 21,647,243,991

LinkedStrand: splice length 67,108,864 time 0.495 recombinant length 43,289,852,631

LinkedStrand: splice length 134,217,728 time 0.053 recombinant length 86,575,069,911

It can be seen that as splice length doubles, the time remains relatively constant.

## Determine the largest power-of-two splice supported with 512M heap

The largest power-of-two splice supported with 512M heap is 67,108,864.

## Determine the largest power-of-two splice supported with 1024M heap

The largest power-of-two splice supported with 1024M heap is 134,217,728.

## Determine the largest power-of-two splice supported as heap doubles

The largest splice my 4GB laptop could recombine was 536,870,912.