Understand Java Parallel Streams Internals: Demo’ing Collector Performance

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Learning Objectives in this Part of the Lesson

- Understand parallel stream internals, e.g.
  - Know what can change & what can’t
  - Partition a data source into “chunks”
  - Process chunks in parallel via the common fork-join pool
  - Configure the Java parallel stream common fork-join pool
  - Perform a reduction to combine partial results into a single result
  - Recognize key behaviors & differences of non-concurrent & concurrent collectors
  - Learn how to implement non-concurrent & concurrent collectors
  - Be aware of performance variance in concurrent & non-concurrent collectors

See [github.com/douglascraigschmidt/LiveLessons/tree/master/Java8/ex14](https://github.com/douglascraigschmidt/LiveLessons/tree/master/Java8/ex14)
Demonstrating Collector Performance
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- Concurrent & non-concurrent collectors perform differently when used in parallel & sequential streams on different input sizes

See prior lessons on “Java Parallel Streams Internals: Non-Concurrent and Concurrent Collectors”
Demonstrating Collector Performance

- A non-concurrent collector operates by merging sub-results

Different threads operate on different instances of the intermediate result containers
A concurrent collector creates one concurrent mutable result container & accumulates elements into it from multiple threads in a parallel stream.
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Thus there’s no need to merge any intermediate sub-results!
Demonstrating Collector Performance

- Results show collector differences become more significant as input grows

Starting collector tests for 1000 words...printing results
  21 msecs: sequential timeStreamCollectToSet()
  30 msecs: parallel timeStreamCollectToSet()
  39 msecs: sequential timeStreamCollectToConcurrentSet()
  59 msecs: parallel timeStreamCollectToConcurrentSet()

...

Starting collector tests for 100000 words...printing results
  219 msecs: parallel timeStreamCollectToConcurrentSet()
  364 msecs: parallel timeStreamCollectToSet()
  657 msecs: sequential timeStreamCollectToSet()
  804 msecs: sequential timeStreamCollectToConcurrentSet()

Starting collector tests for 883311 words...printing results
  1782 msecs: parallel timeStreamCollectToConcurrentSet()
  3010 msecs: parallel timeStreamCollectToSet()
  6169 msecs: sequential timeStreamCollectToSet()
  7652 msecs: sequential timeStreamCollectToConcurrentSet()

See upcoming lessons on “When [Not] to Use Parallel Streams”
Demonstrating Collector Performance

```java
private static void runCollectorTests() {
  Arrays
  .asList(1000, 10000, 100000, 1000000)
  .forEach(limit -> {
    // Create a List of strings containing all the
    // words in the complete works of Shakespeare.
    List<CharSequence> arrayWords =
      TestDataFactory.getInput(sSHAKESPEARE_DATA_FILE,
                               // Split input into "words" by
                               // ignoring whitespace.
                               splitter: "\s*",
                               limit);

    // Print a message when the test starts.
    System.out.println("Starting collector tests for " + arrayWords.size());
  });
```

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End of Understand Java Parallel Streams Internals: Demo’ing Collector Performance