Java Parallel Streams Internals: Demo’ ing How to Configure the Common Fork-Join Pool

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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
  - Know the performance impact of configuring the common fork-join pool size

Entering the test program with 12 cores
ex20: testDefaultDownloadBehavior() downloaded and stored 42 images using 12 threads in the pool
ex20: testAdaptiveMBDownloadBehavior() downloaded and stored 42 images using 43 threads in the pool
ex20: testAdaptiveBTDownloadBehavior() downloaded and stored 42 images using 43 threads in the pool

Printing 3 results from fastest to slowest
testAdaptiveBTDownloadBehavior() executed in 3598 msecs
testAdaptiveMBDownloadBehavior() executed in 3910 msecs
testDefaultDownloadBehavior() executed in 4104 msecs

Leaving the test program

See github.com/douglascraigschmidt/LiveLessons/tree/master/Java8/ex20
Demo’ing Impact of Configuring Common Fork-Join Pool
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- The common fork-join pool size can be controlled programmatically.
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This demo applies the Managed Blocker interface to adaptively add new worker threads to the Java common fork-join pool.

```java
File downloadAndStoreImageMB(URL url) {
    final Image[] image = new Image[1];
    ...
    ForkJoinPool.
        .managedBlock(new ForkJoinPool
            .ManagedBlocker() {
            public boolean block() {
                image[0] =
                    downloadImage(url);
                return true;
            }
        });
    return image[0].store(); ...
}
```

Demo'ing Impact of Configuring Common Fork-Join Pool

- This program shows the performance difference of using ManagedBlocker versus not using ManagedBlocker for an I/O-intensive app

```java
void testDownloadBehavior(Function<URL, File> downloadAndStoreImage, String testName) {
...
    List<File> imageFiles = Options.instance().getUrlList().parallelStream()
        .map(downloadAndStoreImage)
        .collect(Collectors.toList());
   printStats(testName, imageFiles.size()); ...
```
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```

Demo'ing Impact of Configuring Common Fork-Join Pool

This function param is used to pass different strategies for downloading & storing images from remote websites.

• Results show increasing worker threads in the pool improves performance

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Leaving the test program

See upcoming lessons on “The Java Fork-Join Pool: the ManagedBlocker Interface"
Demo'ing Impact of Configuring Common Fork-Join Pool

```java
// Warm up the common fork-join pool.
warmUpThreadPool();

// Runs the tests using the Java fork-join framework's default behavior, which does not add new worker threads to the pool when blocking occurs.
runTest(this::downloadAndStoreImage,
        testName: "testDefaultDownloadBehavior()");

// Run the tests using the BlockingTask wrapper around the Java fork-join framework's ManagedBlocker mechanism, which adds new worker threads to the pool adaptively when blocking occurs.
runTest(this::downloadAndStoreImageMB,
        testName: "testAdaptiveMBDownloadBehavior()");

// Run the tests using the BlockingTask wrapper for the Java fork-join framework's ManagedBlocker mechanism, which adds new worker threads to the pool adaptively when blocking occurs.
runTest(this::downloadAndStoreImageBT,
        testName: "testAdaptiveBTDownloadBehavior()");

// Print the results.
```
End of Java Parallel Streams Internals: Demo’ing How to Configure the Common Fork-Join Pool