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

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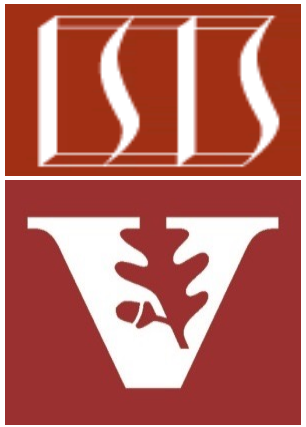

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Learning Objectives in this Part of the Lesson

- 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
  - Know how parallel streams map onto the common fork-join pool framework
- Configure the Java parallel stream common fork-join pool
  - Know the impact of configuring the common fork-join pool size

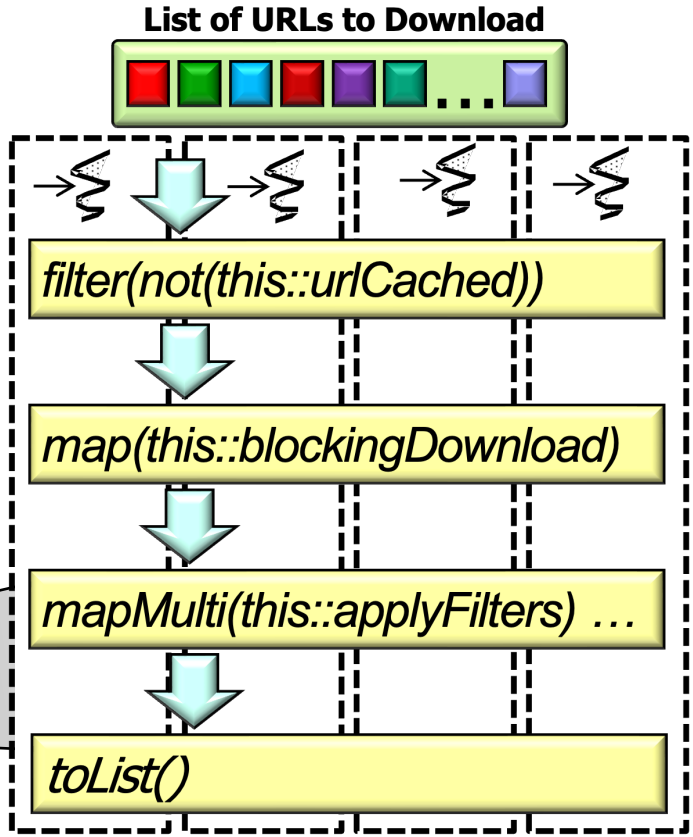
```
Entering the test program with 12 cores
ex20: testDefaultDownloadBehavior() downloaded
      and stored 42 images using 12 threads
      in the pool
ex20: testAdaptiveMBDownloadBehavior()
      downloaded and stored 42 images using
      43 threads in the pool
ex20: testAdaptiveBTDownloadBehavior()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

Demo'ing Impact of Configuring Common Fork-Join Pool

- The common fork-join pool size can be controlled programmatically



See prior lesson on "*Java Parallel Stream Internals: Configuring the Common Fork-Join Pool*"

Demo'ing Impact of Configuring Common Fork-Join Pool

- The common fork-join pool size can be controlled programmatically
  - This demo applies the Managed Blocker interface to adaptively add new worker threads to the Java common fork-join pool


```
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(); ...
```

See docs.oracle.com/javase/8/docs/api/java/util/concurrent/ForkJoinPool.ManagedBlocker.html

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

```
void testDownloadBehavior(Function<URL, File>
                                    downloadAndStoreImage,
                          String testName) {
  ...
  List<File> imageFiles = Options.instance()
    .getUrlList()
    .parallelStream()

    .map(downloadAndStoreImage)

    .toList();
  printStats(testName, imageFiles.size()); ...
```

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

```
void testDownloadBehavior(Function<URL, File>
                                    downloadAndStoreImage,
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  List<File> imageFiles = Options.instance()
    .getUrlList()
    .parallelStream()

    .map(downloadAndStoreImage)

    .toList();
  printStats(testName, imageFiles.size()); ...
```

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

See en.wikipedia.org/wiki/Strategy_pattern

Demo'ing Impact of Configuring Common Fork-Join Pool

- Results show increasing worker threads in the pool improves performance

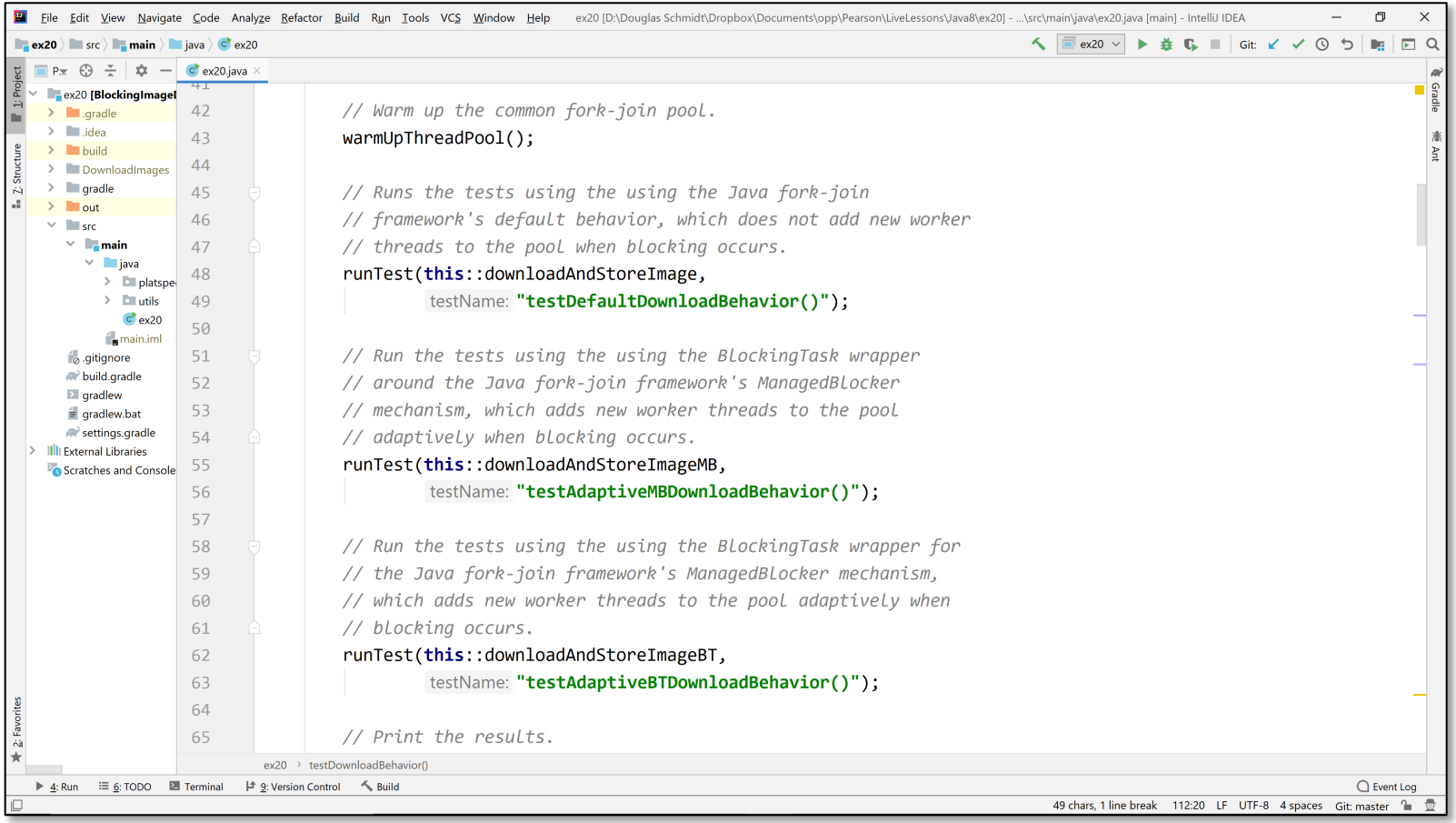
```
Entering the test program with 12 cores
ex20: testDefaultDownloadBehavior() downloaded and stored 42 images
      using 12 threads in the pool
ex20: testAdaptiveMBDownloadBehavior() downloaded and stored 42 images
      using 43 threads in the pool
ex20: testAdaptiveBTDownloadBehavior() downloaded 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 upcoming lessons on "*The Java Fork-Join Pool: the ManagedBlocker Interface*"

Demo'ing Impact of Configuring Common Fork-Join Pool



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