Java Parallel Streams Internals: Configuring 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

```java
String desiredThreads = "8";
System.setProperty("java.util.concurrent.ForkJoinPool.common.parallelism",
   desiredThreads);
```
Configuring the Parallel Stream Common Fork-Join Pool
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• By default the common ForkJoinPool has one less thread than the # of cores

System.out.println
("The parallelism in the"
+ "common fork-join pool is "
+ ForkJoinPool
  .getCommonPoolParallelism());

e.g., returns 3 on a quad-core processor

See github.com/douglascraigschmidt/LiveLessons/blob/master/SearchForkJoin
Configuring the Parallel Stream Common Fork-Join Pool

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A parallel stream can use all cores since it uses the invoking thread, e.g., main thread.
Configuring the Parallel Stream Common Fork-Join Pool

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• Consider a parallel image downloading & processing app

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Problems may occur when trying to download more images than # of cores

These problems may range from underutilization of processor cores to deadlock.
Configuring the Parallel Stream Common Fork-Join Pool

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

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```

It’s hard to estimate the total # of threads to set in the common fork-join pool.
Configuring the Parallel Stream Common Fork-Join Pool

- The common fork-join pool size can be controlled programmatically.
- Setting this property affects all parallel streams in a process.

```java
String desiredThreads = "8";
System.setProperty(
    "java.util.concurrent.ForkJoinPool.common.parallelism",
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```
The common fork-join pool size can be controlled programmatically. Setting this property affects all parallel streams in a process. This property can be changed only before the common fork-join pool is initialized. i.e., it’s initialized “on-demand” the first time it’s used.

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System.setProperty("java.util.concurrent.ForkJoinPool.common.parallelism",
  + "ForkJoinPool.common.
  + "parallelism",
  desiredThreads);
```

See [en.wikipedia.org/wiki/Lazy_initialization](https://en.wikipedia.org/wiki/Lazy_initialization)
Configuring the Parallel Stream Common Fork-Join Pool

- The common fork-join pool size can be controlled programmatically
  - Setting this property affects all parallel streams in a process
- The ManagedBlocker interface can also be used to add worker threads to common fork-join pool temporarily

```java
SupplierManagedBlocker<T> mb = new SupplierManagedBlocker<>(supplier);
...
ForkJoinPool.managedBlock(mb);
...
return mb.getResult();
```

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  - This is useful for behaviors that block on I/O and/or synchronizers

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  - This is useful for behaviors that block on I/O and/or synchronizers
  - This interface can only be used with the common fork-join pool.

```
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See lessons on “The Java Fork-Join Pool: the ManagedBlocker Interface”