How Java Completable Futures Overcome Limitations of Java Futures

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Learning Objectives in this Part of the Lesson

- Recognize how Java completable futures overcome limitations with Java futures

See earlier lesson on "*Overview of the Java Completable Futures Framework*"

Overcoming Limitations with Java Futures

Overcoming Limitations with Java Futures

- The completable futures framework overcomes Java future limitations

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

Overcoming Limitations with Java Futures

- The completable futures framework overcomes Java future limitations
  - *Can* be completed explicitly


```
CompletableFuture<...> future =
   new CompletableFuture<>();

new Thread (() -> {
   ...
   future.complete(...);
}).start();

...
System.out.println(future.join());
```

After complete() is done calls to join() will unblock

See github.com/douglascraigschmidt/LiveLessons/tree/master/Java8/ex8

Overcoming Limitations with Java Futures

- The completable futures framework overcomes Java future limitations
  - *Can* be completed explicitly
  - *Can* be chained fluently to handle async results efficiently & cleanly

```
CompletableFuture
    .supplyAsync(reduceFraction)
    .thenApply(BigFraction
                   ::toMixedString)
    .thenAccept(System.out::println);
```

The action of each "completion stage" is triggered when the previous stage's future completes asynchronously

See en.wikipedia.org/wiki/Fluent_interface

Overcoming Limitations with Java Futures

- The completable futures framework overcomes Java future limitations
  - *Can* be completed explicitly
  - *Can* be chained fluently to handle async results efficiently & cleanly
    - Async programming thus looks more like sync programming!

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Overcoming Limitations with Java Futures

- The completable futures framework overcomes Java future limitations
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  - *Can* be chained fluently to handle async results efficiently & cleanly
  - *Can* be triggered reactively & efficiently as a *collection* of futures w/out undue overhead


```
CompletableFuture<List
   <BigFraction>> futureToList =
   Stream
      .generate(generator)
      .limit(sMAX_FRACTIONS)
      .map(reduceFractions)
      .collect(FuturesCollector
                  .toFuture());

futureToList
   .thenAccept(printList);
```

Create a single future that will be triggered when a group of other futures all complete

See github.com/douglascraigschmidt/LiveLessons/tree/master/Java8/ex8

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Print out the results after all async fraction reductions have completed

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Java completable futures can also be combined with Java sequential streams

End of How Java Completable Futures Overcome Limitations of Java Futures