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

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

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

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

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

See [github.com/douglas-craigschmidt/LiveLessons/tree/master/Java8/ex8](https://github.com/douglas-craigschmidt/LiveLessons/tree/master/Java8/ex8)
Overcoming Limitations with Java Futures

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

```java
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!

CompletableFuture
  .supplyAsync(reduceFraction)
  .thenApply(BigFraction::toMixedString)
  .thenAccept(System.out::println);
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
  - *Can* be triggered reactively & efficiently as a *collection* of futures w/out undue overhead

```java
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](https://github.com/douglascraigschmidt/LiveLessons/tree/master/Java8/ex8)
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futureToList
    .thenAccept(printList);

Print out the results after all async fraction reductions have completed
```
Overcoming Limitations with Java Futures

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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