Advanced Java Completable Future Features: Applying Completion Stage Methods (Part 2)

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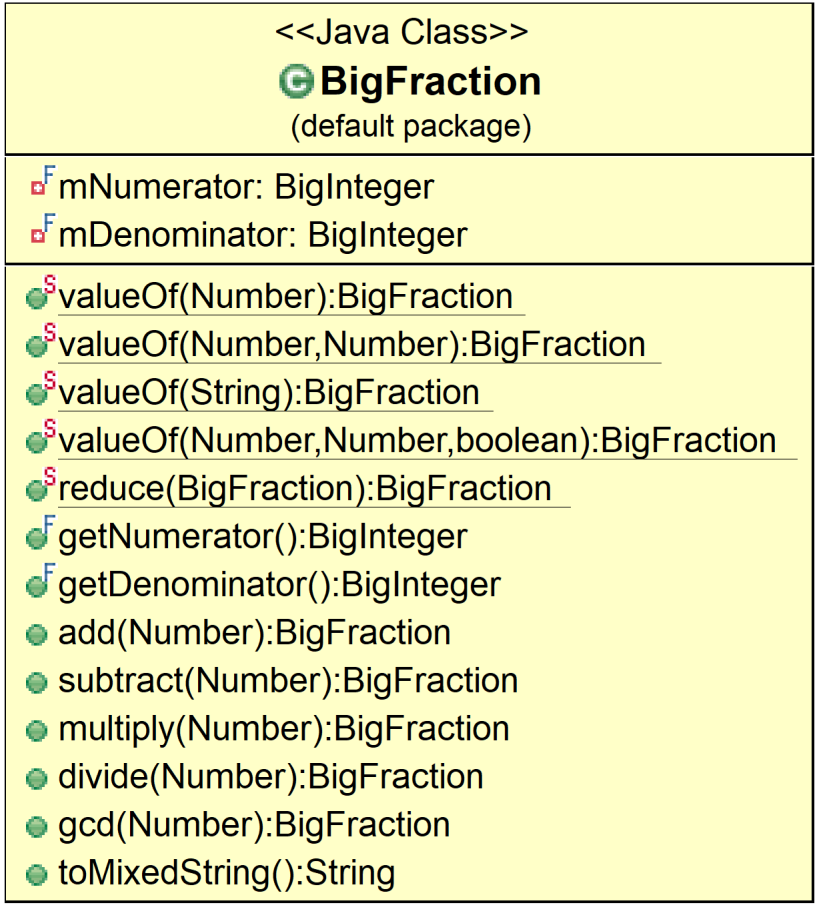
Learning Objectives in this Part of the Lesson

- Understand how completion stage methods chain dependent actions
- Know how to group these methods
- Single stage methods
- Two stage methods (and)
- Two stage methods (or)
- Apply these methods
  - supplyAsync(), thenCompose(), & thenApplyAsync()
  - thenAccept() & acceptEither()



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

Applying Completable Future Completion Stage Methods

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- We show key completion stage methods via the testFractionMultiplications1() method that multiplies big fractions using a stream of CompletableFutures

```
static void testFractionMultiplications1() {
   ...
   Stream.generate(() -> makeBigFraction(new Random(), false))

         .limit(sMAX_FRACTIONS)

         .map(reduceAndMultiplyFraction)

         .collect(FuturesCollector.toFuture())

         .thenAccept(ex8::sortAndPrintList);
}
```

Return a single future to a list of big fractions being reduced & multiplied asynchronously

See lesson on "*Advanced Java Completable Future Features: Implementing FuturesCollector*"

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   ...
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         .limit(sMAX_FRACTIONS)

         .map(reduceAndMultiplyFraction)

         .collect(FuturesCollector.toFuture())

         .thenAccept(ex8::sortAndPrintList);
}
```

Sort & print results when all async computations complete

Applying Completable Future Completion Stage Methods

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```
static void sortAndPrintList(List<BigFraction> list) {
```

Sort & print a list of reduced & multiplied big fractions

```
  CompletableFuture<List<BigFraction>> quickSortF =
    CompletableFuture.supplyAsync(() -> quickSort(list));

  CompletableFuture<List<BigFraction>> mergeSortF =
    CompletableFuture.supplyAsync(() -> mergeSort(list));


  quickSortF.acceptEither(mergeSortF, sortedList ->
      sortedList.forEach(frac -> display(frac.toMixedString()));
}; ...
```

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  quickSortF.acceptEither(mergeSortF, sortedList ->
      sortedList.forEach(frac -> display(frac.toMixedString())));
}; ...
```

Asynchronously apply quick sort & merge sort!

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  quickSortF.acceptEither(mergeSortF, sortedList ->
      sortedList.forEach(frac -> display(frac.toMixedString()));
}; ...
```

Apply whichever result finishes first..

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static void sortAndPrintList(List<BigFraction> list) {


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    CompletableFuture.supplyAsync(() -> quickSort(list));

  CompletableFuture<List<BigFraction>> mergeSortF =
    CompletableFuture.supplyAsync(() -> mergeSort(list));
```

If future is already completed the action runs in the thread that registered the action

```
  quickSortF.acceptEither(mergeSortF, sortedList ->
      sortedList.forEach(frac -> display(frac.toMixedString())));
}; ...
```

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    CompletableFuture.supplyAsync(() -> mergeSort(list));

  quickSortF.acceptEither(mergeSortF, sortedList ->
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}; ...
```

Otherwise, the action runs in the thread in which the previous stage ran

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  CompletableFuture<List<BigFraction>> quickSortF =
    CompletableFuture.supplyAsync(() -> quickSort(list));

  CompletableFuture<List<BigFraction>>
    CompletableFuture.supplyAsync(() ->


  quickSortF.acceptEither(mergeSortF, sortedList ->
      sortedList.forEach(frac -> display(frac.toMixedString())));
}; ...
```

acceptEither() does *not* cancel the second future after the first one completes

End of Advanced Java CompletableFuture Features: Applying Completion Stage Methods (Part 2)