Advanced Java CompletableFuture Features: Two Stage Completion Methods (Part 2)

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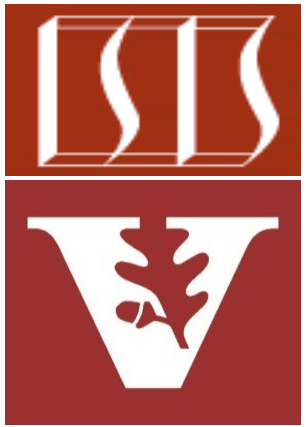

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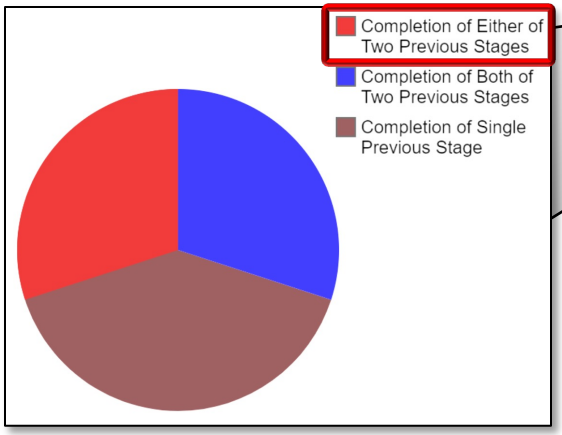
Learning Objectives in this Part of the Lesson

- 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)



Completion stage methods

Exception methods

Arbitrary-arity methods

Factory methods

Basic methods

See en.wikipedia.org/wiki/Logical_disjunction

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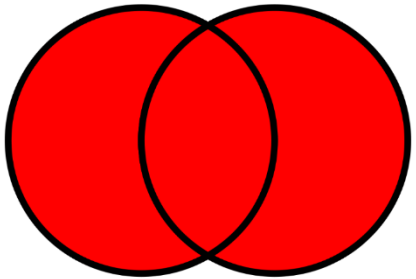
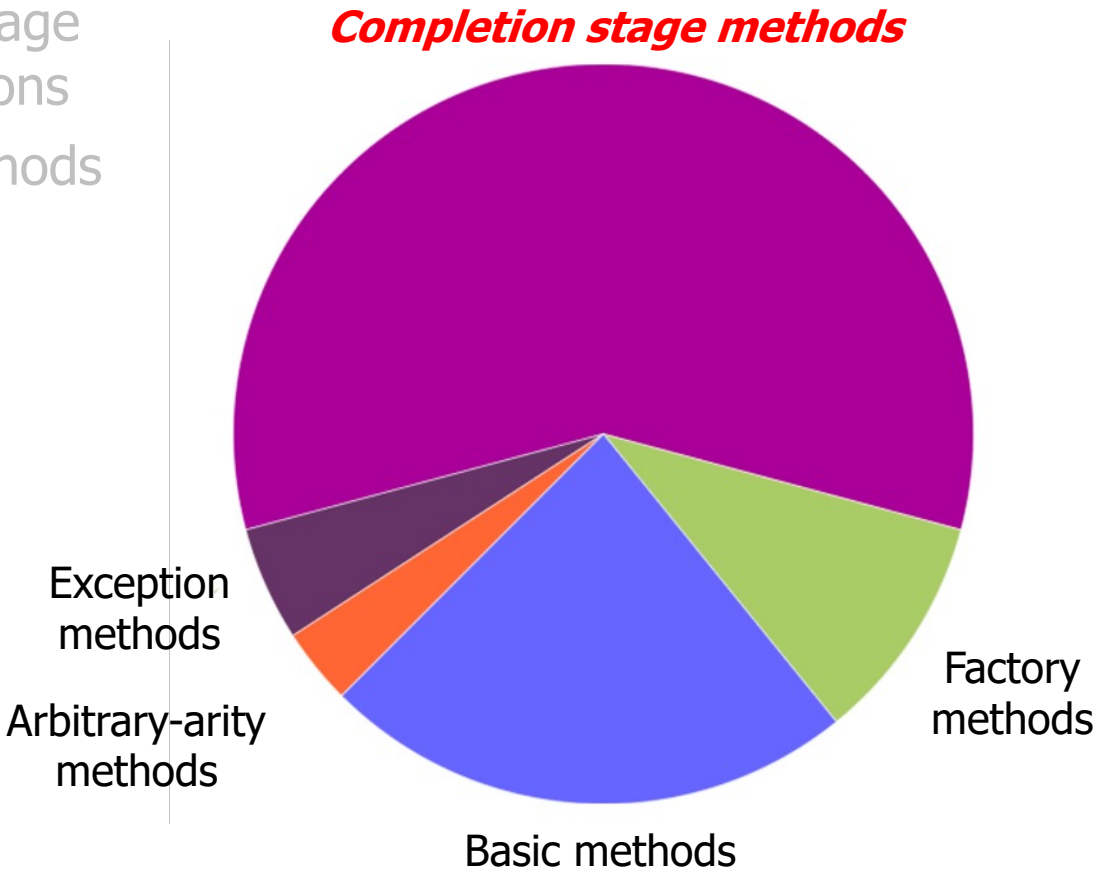




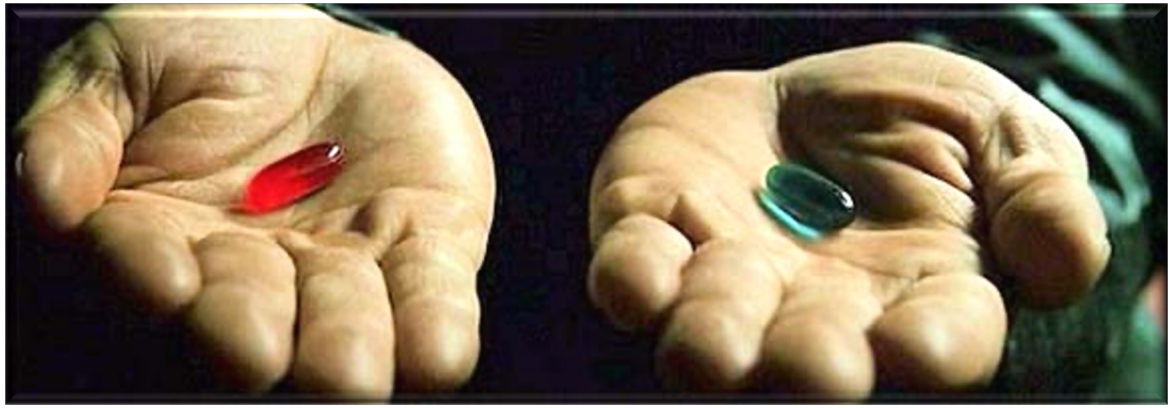
See en.wikipedia.org/wiki/Logical_disjunction

Methods Triggered by Completion of Two Stages

Methods Triggered by Completion of Either of Two Stages

- Methods triggered by completion of either of two previous stages
  - acceptEither()

```
CompletableFuture<Void> acceptEither
  (CompletionStage<? Extends T>
                        other,
   Consumer<? super T> action)
{ ... }
```



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

Methods Triggered by Completion of Either of Two Stages

- Methods triggered by completion of either of two previous stages
  - acceptEither()
    - Applies a Consumer action that handles either of the previous stages' results

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CompletableFuture<Void> acceptEither
  (CompletionStage<? Extends T>
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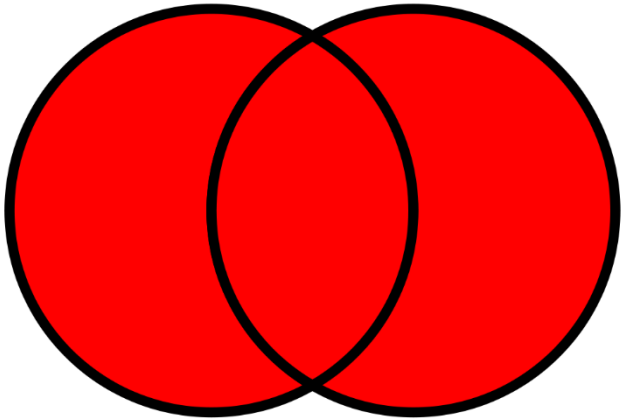

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Methods Triggered by Completion of Either of Two Stages

- Methods triggered by completion of either of two previous stages
  - acceptEither()
    - Applies a Consumer action that handles either of the previous stages' results
      - Two futures are used here:

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CompletableFuture<Void> acceptEither
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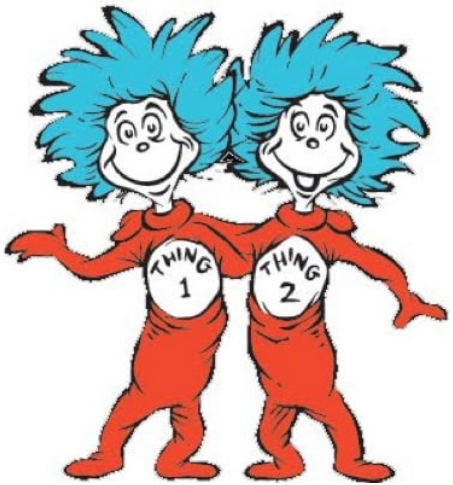

Methods Triggered by Completion of Either of Two Stages

- Methods triggered by completion of either of two previous stages
  - acceptEither()
    - Applies a Consumer action that handles either of the previous stages' results
      - Two futures are used here:
        - The future used to invoke acceptEither()
          - Not shown since it's not part of the method signature, but is implied since acceptEither() is a non-static method

```
CompletableFuture<Void> acceptEither
 (CompletionStage<? Extends T>
                        other,
  Consumer<? super T> action)
{ ... }
```

Methods Triggered by Completion of Either of Two Stages

- Methods triggered by completion of either of two previous stages
  - acceptEither()
    - Applies a Consumer action that handles either of the previous stages' results
      - Two futures are used here:
        - The future used to invoke acceptEither()
        - The `other' future passed to acceptEither()

```
CompletableFuture<Void> acceptEither
 (CompletionStage<? Extends T>
                        other,
  Consumer<? super T> action)
{ ... }
```

Methods Triggered by Completion of Either of Two Stages

- Methods triggered by completion of either of two previous stages
  - acceptEither()
    - Applies a Consumer action that handles either of the previous stages' results
    - Returns a future to Void

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CompletableFuture<Void> acceptEither
  (CompletionStage<? Extends T>
                          other,
   Consumer<? super T> action)
{ ... }
```

See www.baeldung.com/java-void-type

Methods Triggered by Completion of Either of Two Stages

- Methods triggered by completion of either of two previous stages
  - acceptEither()
    - Applies a Consumer action that handles either of the previous stages' results
    - Returns a future to Void
    - Often used at the end of a chain of completion stages

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

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

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

Create a pair of CompletableFuture objects that will contain the results of sorting the list using two different algorithms in two different threads

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

Methods Triggered by Completion of Either of Two Stages

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

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

quickSortF.acceptEither
  (mergeSortF, results -> results
    .forEach(fraction ->
             System.out.println
              (fraction
               .toMixedString())));
```

This method is invoked when either quickSortF or mergeSortF complete

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

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

quickSortF.acceptEither
  (mergeSortF, results -> results
    .forEach(fraction ->
               System.out.println
                (fraction
                 .toMixedString())));
```

Printout sorted results from which ever sorting routine finished first

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

quickSortF.acceptEither
  (mergeSortF, results -> results
    .forEach(fraction ->
               System.out.println
                 (fraction
                  .toMixedString())));
```

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

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

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

quickSortF.acceptEitherAsync
  (mergeSortF, results ->
    aLongDurationConsumer(results))
```

acceptEitherAsync() can be used if a long-duration Consumer is applied

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

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