Advanced Java CompletableFuture Features: Two Stage Completion Methods (Part 1)

Douglas C. Schmidt
d.schmidt@vanderbilt.edu
www.dre.vanderbilt.edu/~schmidt

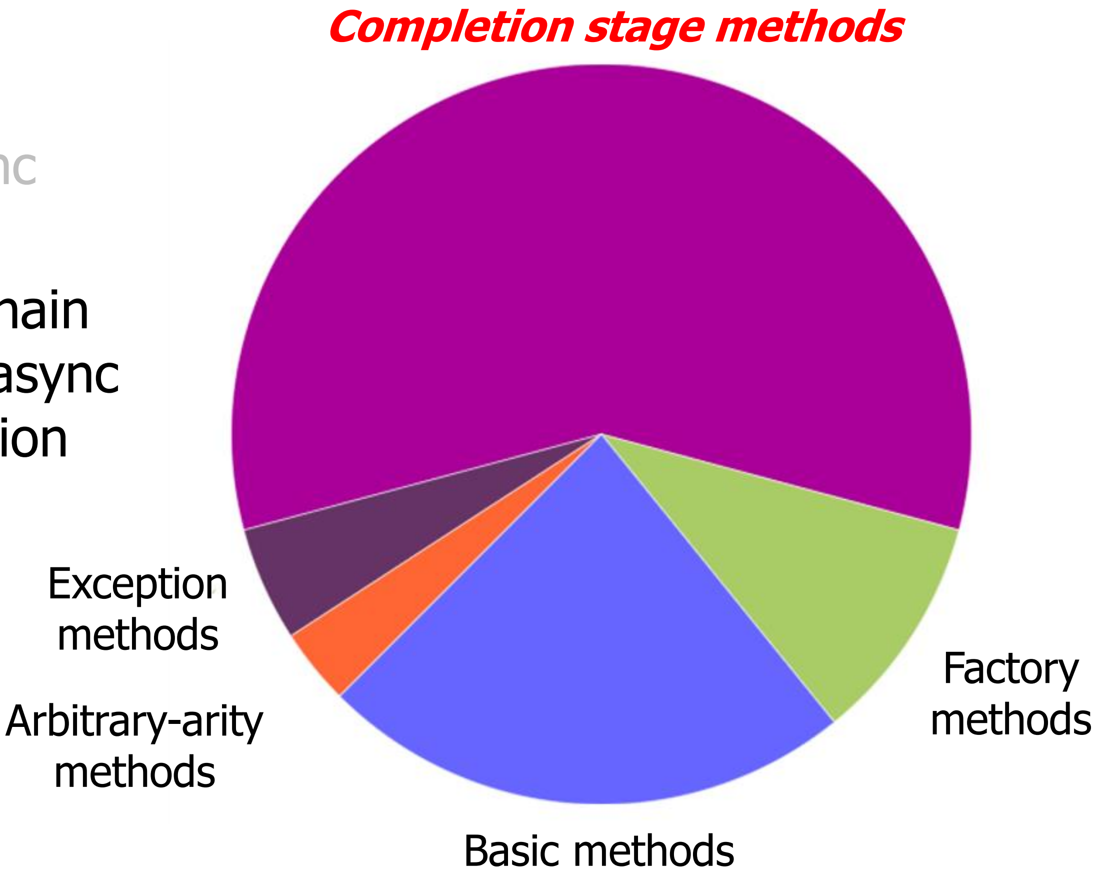
Professor of Computer Science

Institute for Software
Integrated Systems

Vanderbilt University
Nashville, Tennessee, USA

Learning Objectives in this Part of the Lesson

- Understand advanced features of completable futures, e.g.
  - Factory methods initiate async computations
  - Completion stage methods chain together actions to perform async result processing & composition
    - Method grouping
    - Single stage methods
    - Two stage methods (and)



Methods Triggered by Completion of Both of Two Stages

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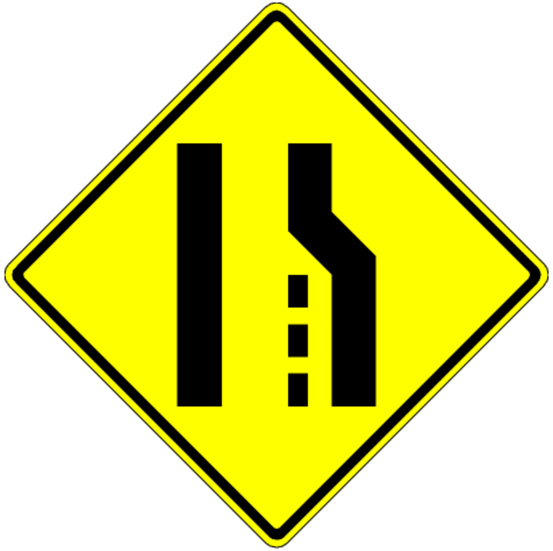
  - thenCombine()



```
CompletableFuture<U> thenCombine
   (CompletionStage<? Extends U>
                          other,
    BiFunction<? super T,
                 ? super U,
                 ? extends V> fn)
{ ... }
```

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

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    - Applies a bifunction action to two previous stages' results

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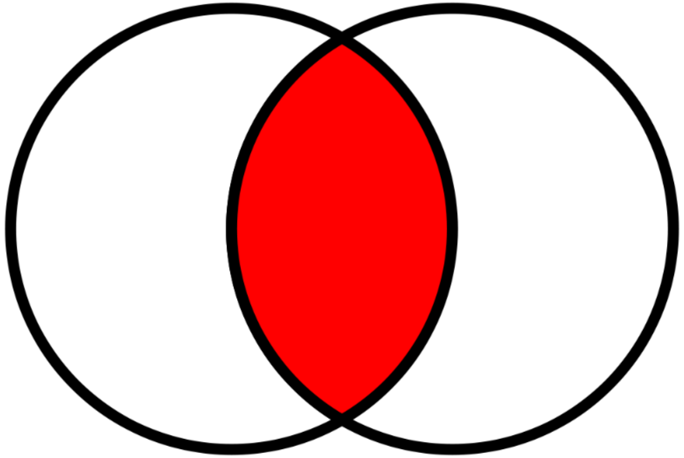

See en.wikipedia.org/wiki/Logical_conjunction

Methods Triggered by Completion of Both of Two Stages

- Methods triggered by completion of both of two previous stages
  - thenCombine()
    - Applies a bifunction action to two previous stages' results
      - Two futures are used here:
        - The future used to invoke thenCombine()
        - The `other' future passed to thenCombine()

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Methods Triggered by Completion of Both of Two Stages

- Methods triggered by completion of both of two previous stages
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    - Applies a bifunction action to two previous stages' results
    - Returns a future containing the result of the action

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thenCombine() essentially performs a "reduction"

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- Methods triggered by completion of both of two previous stages
  - thenCombine()
    - Applies a bifunction action to two previous stages' results
    - Returns a future containing the result of the action
    - Used to "join" two paths of asynchronous execution

```
CompletableFuture<BF> compF1 =
    CompletableFuture
    .supplyAsync(() ->
       /* multiply two BFs. */);

CompletableFuture<BF> compF2 =
    CompletableFuture
    .supplyAsync(() ->
       /* divide two BFs. */);

compF1
  .thenCombine(compF2,
               BigFraction::add)

  .thenAccept(System.out::println);
```

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

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Asynchronously multiple & divide two big fractions

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thenCombine()'s action is triggered only after its two associated futures complete

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Print out the results

End of Advanced Java CompletableFuture Features: Two Stage Completion Methods (Part 1)