Understand the Java CompletableFuture ImageStream Gang Case Study: Applying Arbitrary-Arity Methods

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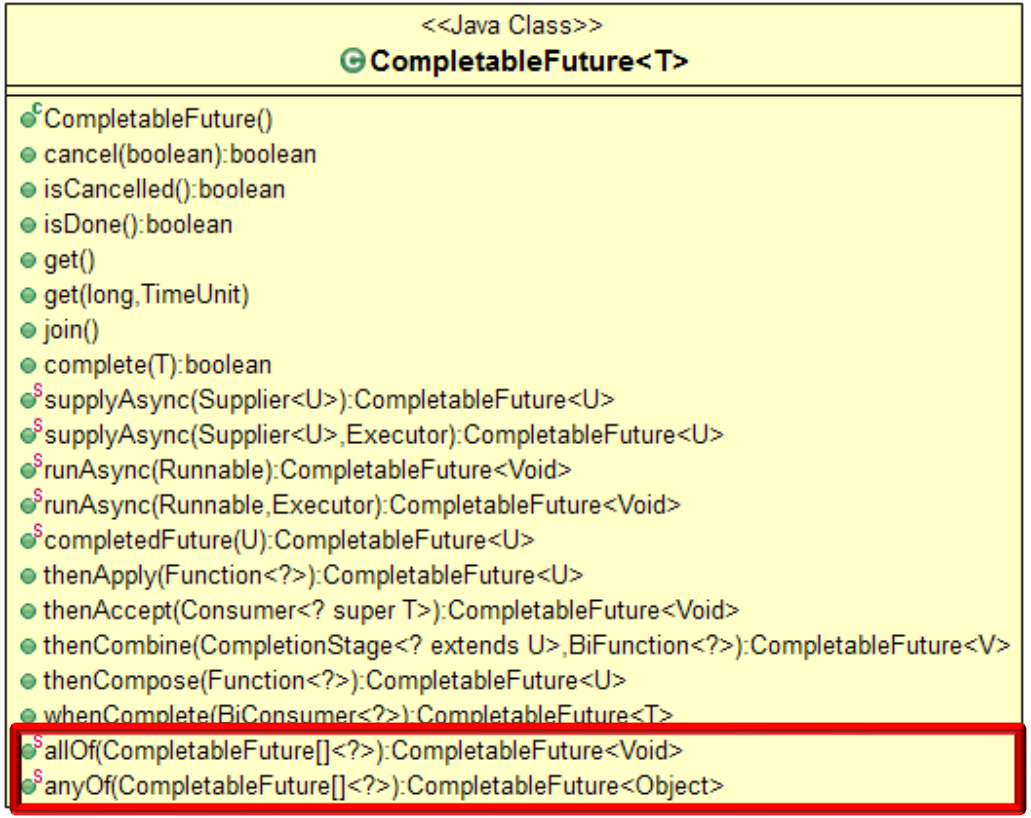
Learning Objectives in this Part of the Lesson

- Understand the design of the Java completable future version of ImageStreamGang
- Know how to apply completable futures to ImageStreamGang, e.g.
  - Factory methods
  - Completion stage methods
  - Arbitrary-arity methods



Applying Arbitrary-Arity Methods in ImageStreamGang

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- collect() returns a future to a stream of futures to images being processed asynchronously


```
void processStream() {
  List<URL> urls = getInput();

  CompletableFuture<Stream<Image>>
    resultsFuture = urls
    .stream()
    .map(this::checkUrlCachedAsync)
    .map(this::downloadImageAsync)
    .flatMap(this::applyFiltersAsync)
    .collect(toFuture())
    .thenApply(stream ->
                 log(stream.flatMap
                     (Optional::stream),
                      urls.size()))
    .join();
```

flatMap() outputs a stream of futures associated with processing that's running asynchronously

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Provides a single means to reactively await the completion of a stream of futures before continuing

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collect() also triggers processing of all the intermediate operations

Applying Arbitrary-Arity Methods in ImageStreamGang

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  - StreamOfFuturesCollector wraps "arbitrary-arity" allOf() method

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Return a future that completes when all futures in the stream complete

See AndroidGUI/app/src/main/java/livelessons/utils/StreamOfFuturesCollector.java

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Log the results after the final future completes

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```

Remove empty optional values from the stream in Java 9+

See docs.oracle.com/javase/9/docs/api/java/util/Optional.html#flatMap

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  .collect(toFuture())
  .thenApply(stream -> log(stream
      .filter(Optional::isPresent)
      .map(Optional::get),
           urls.size()))
  .join();
```

Remove empty optional values from the stream in Java 8

Applying Arbitrary-Arity Methods in ImageStreamGang

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            urls.size()))
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```

Java 8 is more verbose..

See blog.codefx.org/java/java-9-optional

Applying Arbitrary-Arity Methods in ImageStreamGang

- collect() returns a future to a stream of futures to images being processed asynchronously
  - Images are displayed after async processing completes
  - StreamOfFuturesCollector wraps "arbitrary-arity" allOf() method

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Wait until all the async processing is completed

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

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This is the one & only call to join() in this async stream pipeline!

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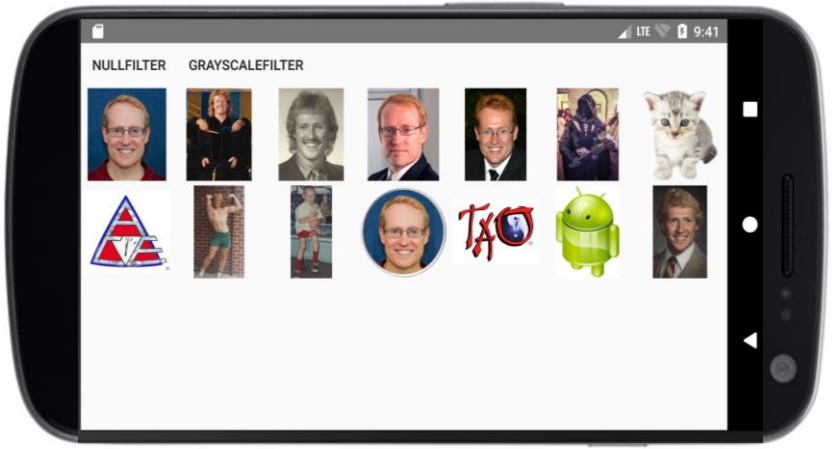


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Images are displayed after all the async processing completes

End of Understand the Java Completable Future ImageStreamGang Case Study: Applying Arbitrary-Arity Methods