Overview of Java Futures

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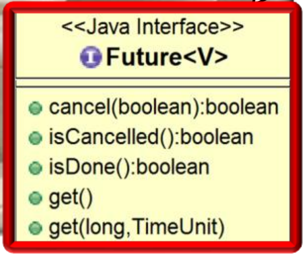
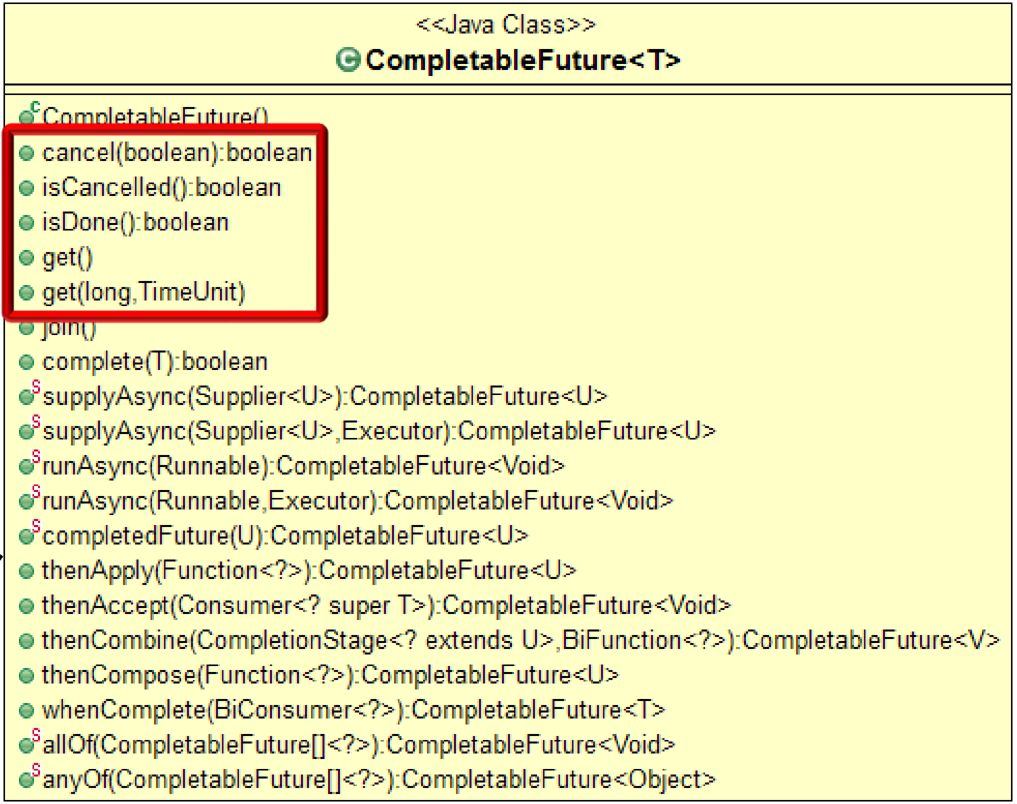
Learning Objectives in this Part of the Lesson

- Motivate the need for Java futures by understanding the pros & cons of synchrony & asynchrony
- Understand that Java futures provide the foundation for completable futures in Java



<<Java Interface>>
Future<V>

- cancel(boolean):boolean
- isCancelled():boolean
- isDone():boolean
- get()
- get(long,TimeUnit)



<<Java Class>>
CompletableFuture<T>

- CompletableFuture()
- cancel(boolean):boolean
- isCancelled():boolean
- isDone():boolean
- get()
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- join()
- complete(T):boolean
- supplyAsync(Supplier<U>):CompletableFuture<U>
- supplyAsync(Supplier<U>,Executor):CompletableFuture<U>
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- completedFuture(U):CompletableFuture<U>
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- allOf(CompletableFuture[]<?>):CompletableFuture<Void>
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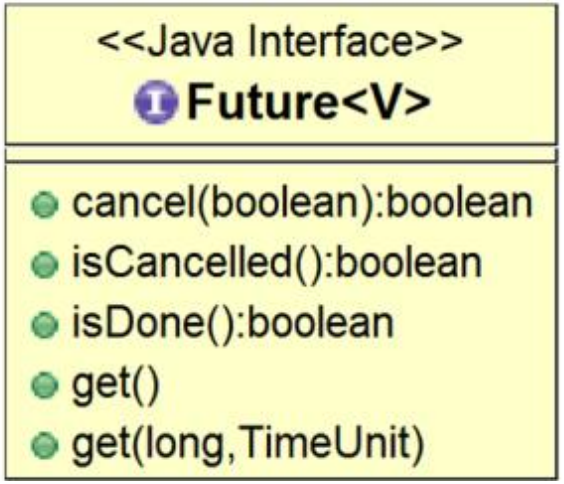
See en.wikipedia.org/wiki/Java_version_history

Learning Objectives in this Part of the Lesson

- Motivate the need for Java futures by understanding the pros & cons of synchrony & asynchrony
- Understand that Java futures provide the foundation for completable futures in Java
  - Recognize a human known use of Java futures

Learning Objectives in this Part of the Lesson

- Motivate the need for Java futures by understanding the pros & cons of synchrony & asynchrony
- Understand that Java futures provide the foundation for completable futures in Java
  - Recognize a human known use of Java futures
  - Know all the methods in the Future interface



See docs.oracle.com/javase/8/docs/api/java/util/concurrent/Future.html

A Human Known Use of Java Futures

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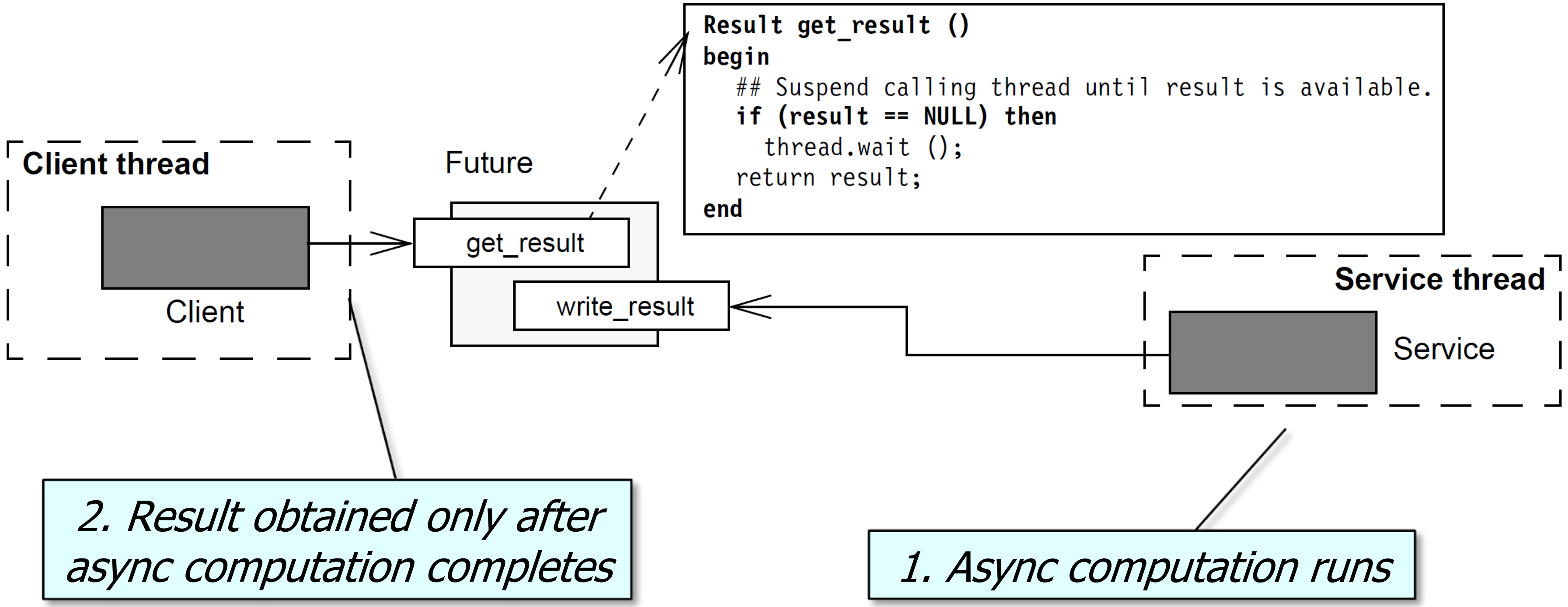
- A future is essentially a proxy that represents the result(s) of an async call


Client thread
Client
Future
get_result
write_result
Service thread
Service
2. Result obtained only after async computation completes
1. Async computation runs

```
Result get_result ()
begin
   ## Suspend calling thread until result is available.
   if (result == NULL) then
     thread.wait ();
   return result;
end
```

See en.wikipedia.org/wiki/Futures_and_promises

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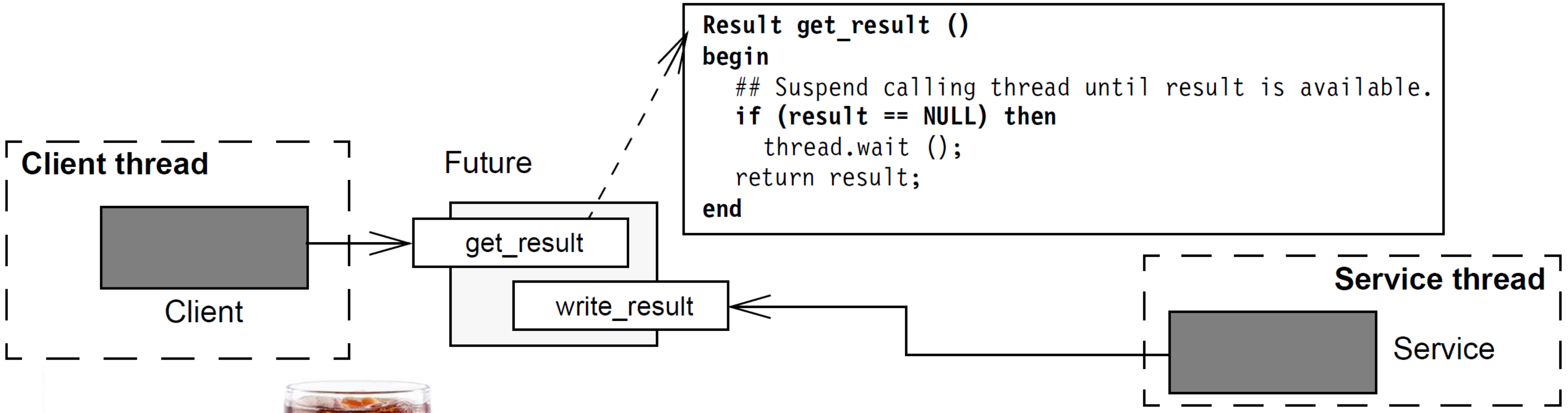

```
Result get_result ()
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  ## Suspend calling thread until result is available.
  if (result == NULL) then
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Table tent #'s are a human-known-use of futures!

See www.citygrafx.com/table-numbers-table-markers

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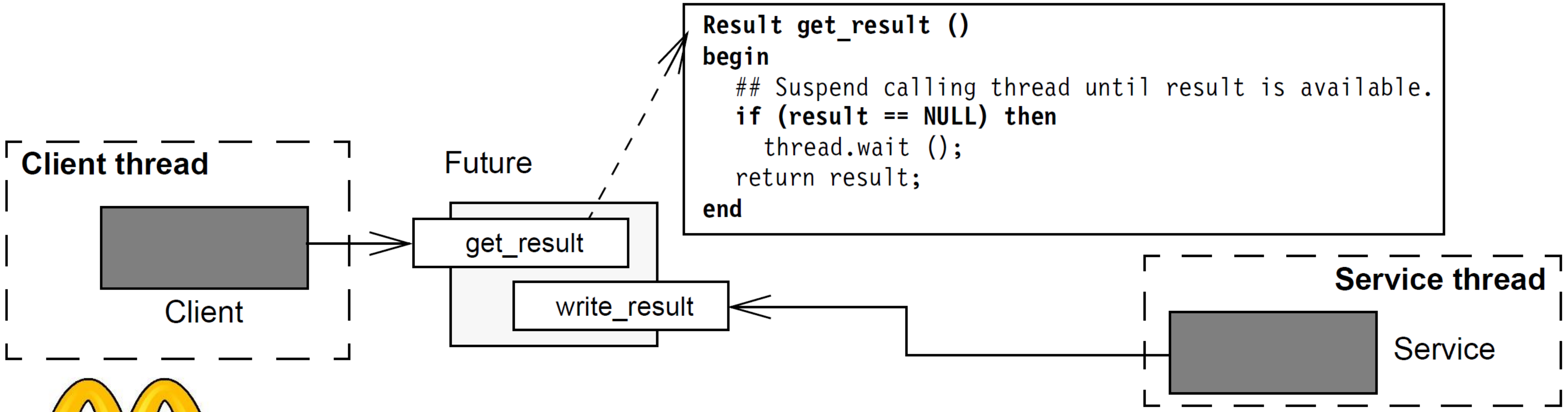

```
Result get_result ()
begin
  ## Suspend calling thread until result is available.
  if (result == NULL) then
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Table tent #'s are a human-known-use of futures!

e.g., McDonald's vs Wendy's model of preparing fast food

Overview of the Java Future API

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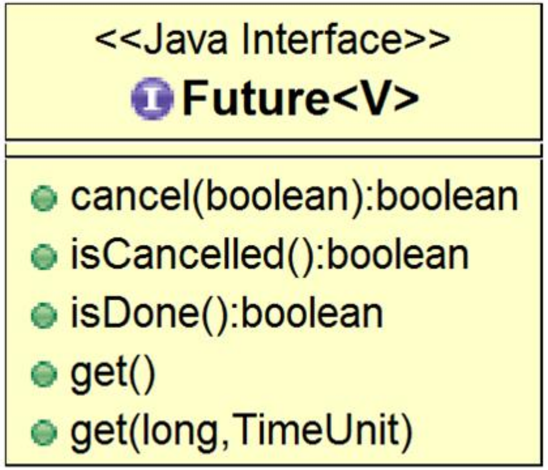
- Java 5 added async call support via the Java Future interface



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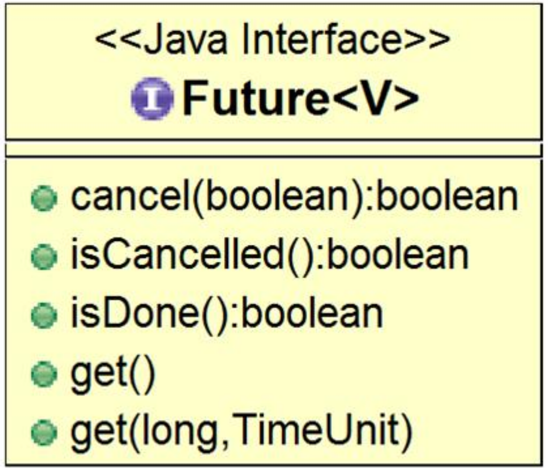
Overview of the Java Future API

- Java Future methods can manage a task's lifecycle after it's submitted to run asynchronously



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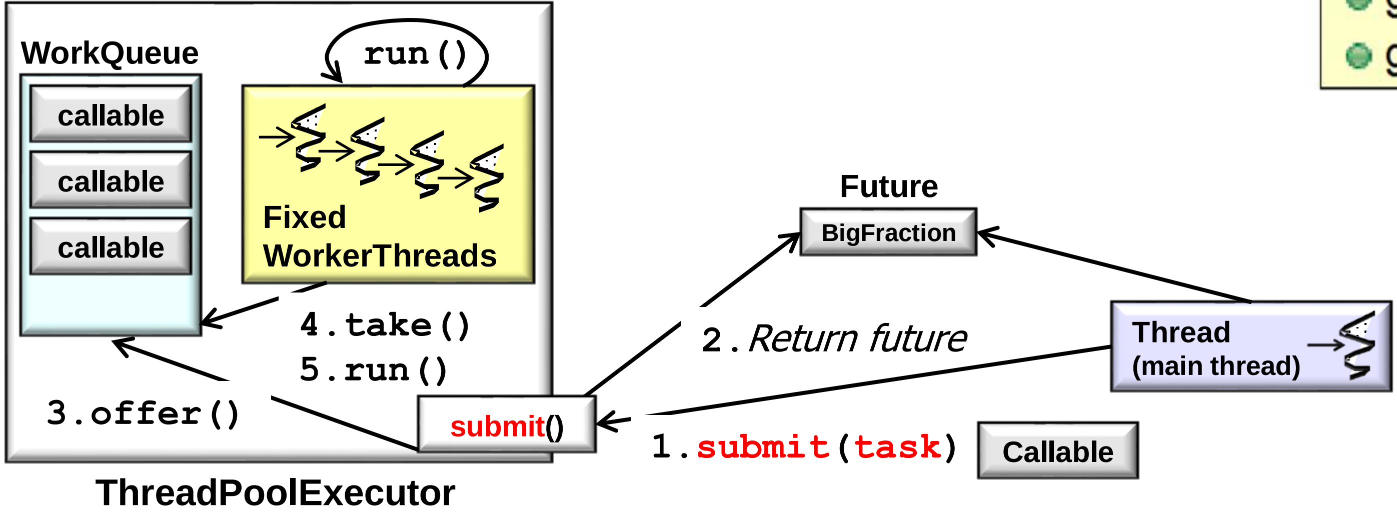
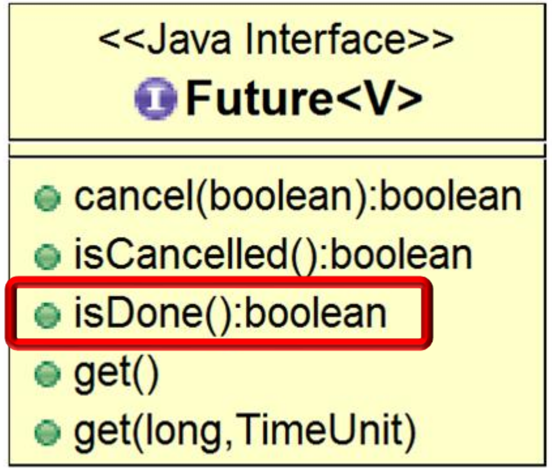
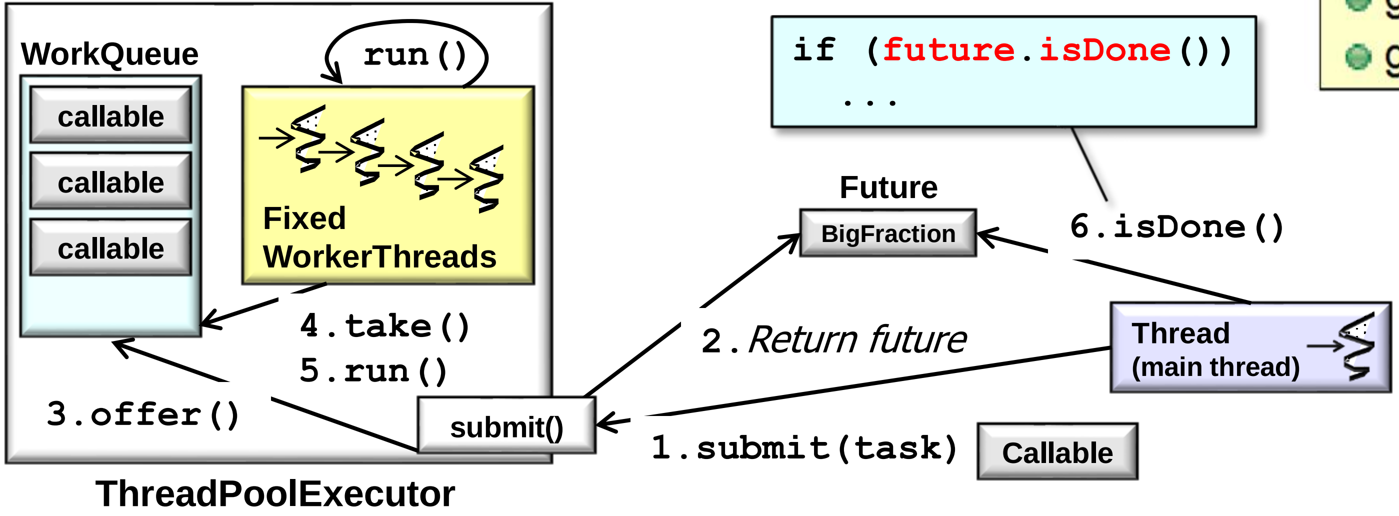


See docs.oracle.com/javase/8/docs/api/java/util/concurrent/Future.html

Overview of the Java Future API

- Java Future methods can manage a task's lifecycle after it's submitted to run asynchronously, e.g.
  - A future can be tested for completion

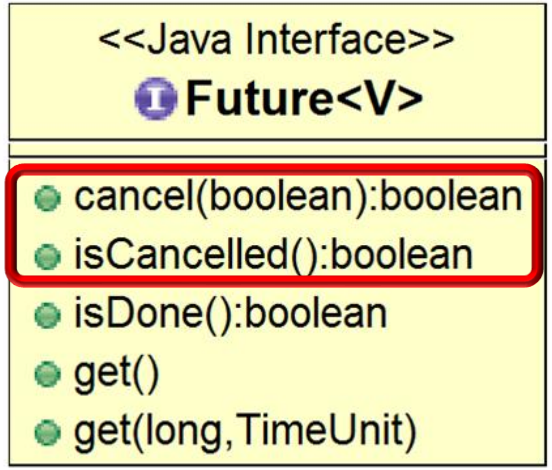




```
if (future.isDone())
  ...
```

Overview of the Java Future API

- Java Future methods can manage a task's lifecycle after it's submitted to run asynchronously, e.g.
  - A future can be tested for completion
  - A future be tested for cancellation & cancelled



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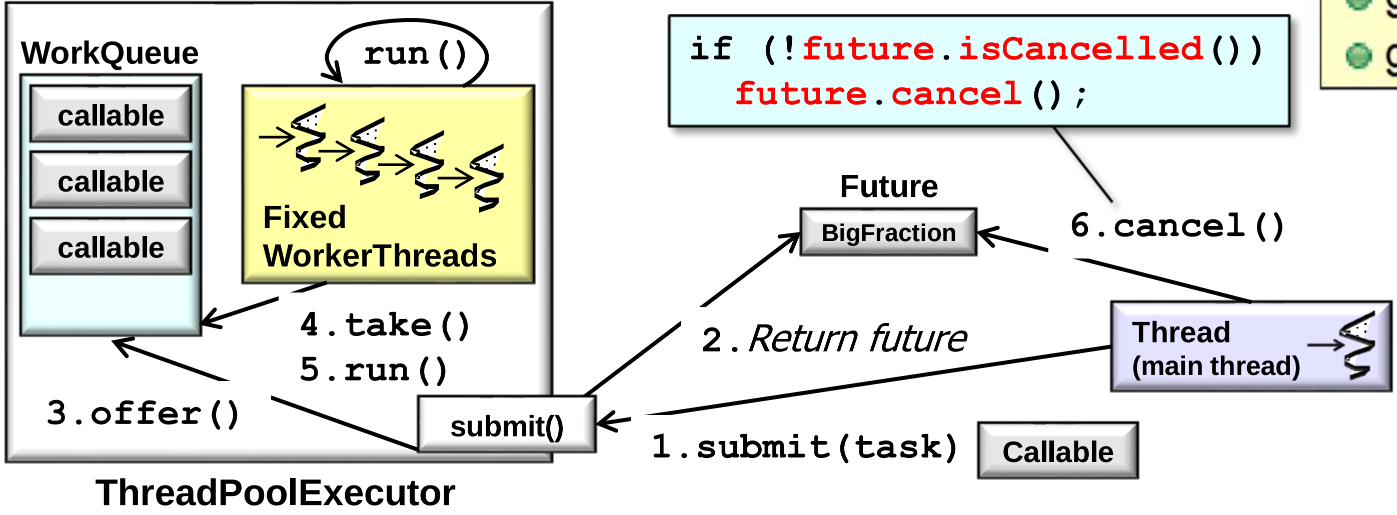
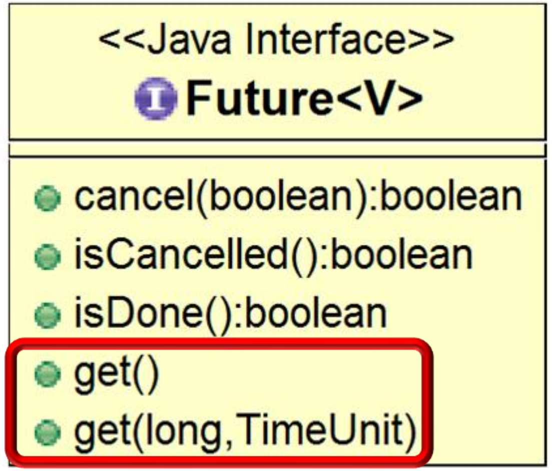


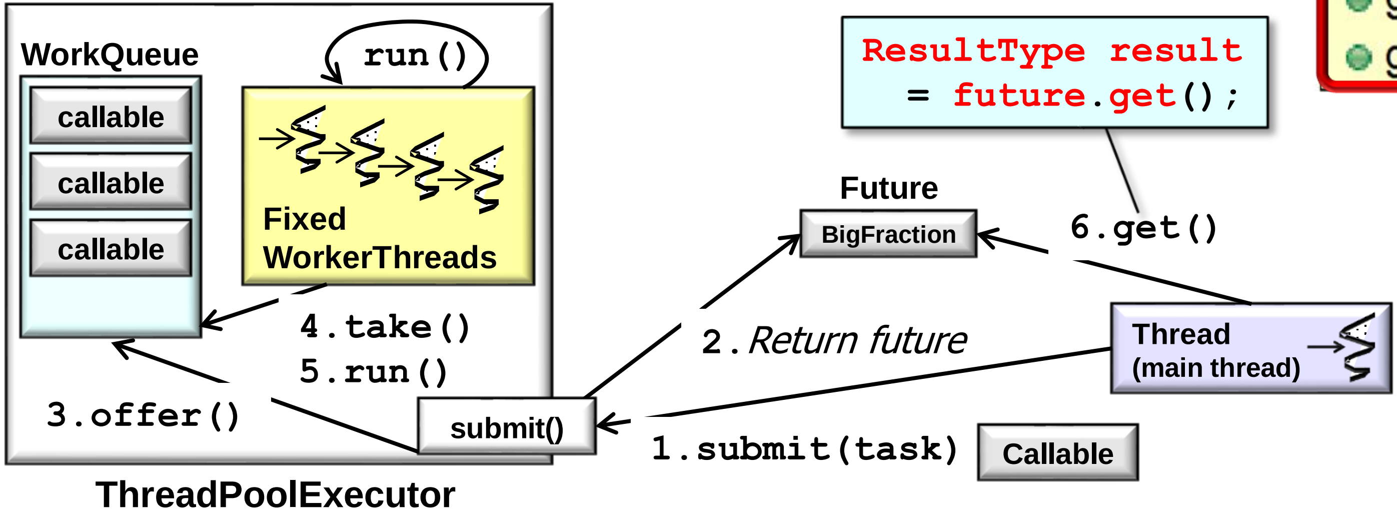
```
if (!future.isCancelled())
  future.cancel();
```

Overview of the Java Future API

- Java Future methods can manage a task's lifecycle after it's submitted to run asynchronously, e.g.
  - A future can be tested for completion
  - A future be tested for cancellation & cancelled
  - A future can retrieve a two-way task's result

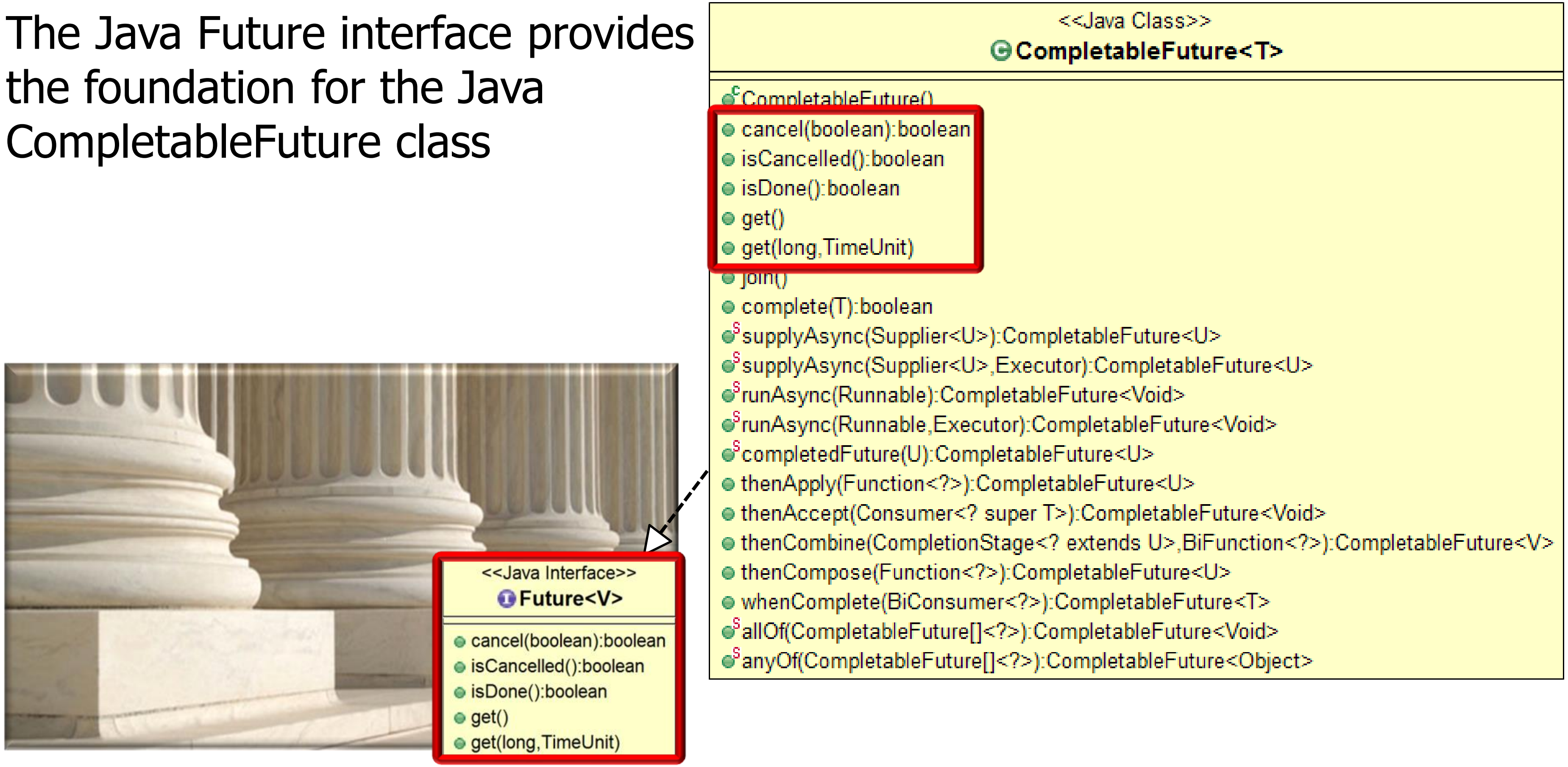


```
ResultType result
  = future.get();
```



Overview of the Java Future API

- The Java Future interface provides the foundation for the Java CompletableFuture class



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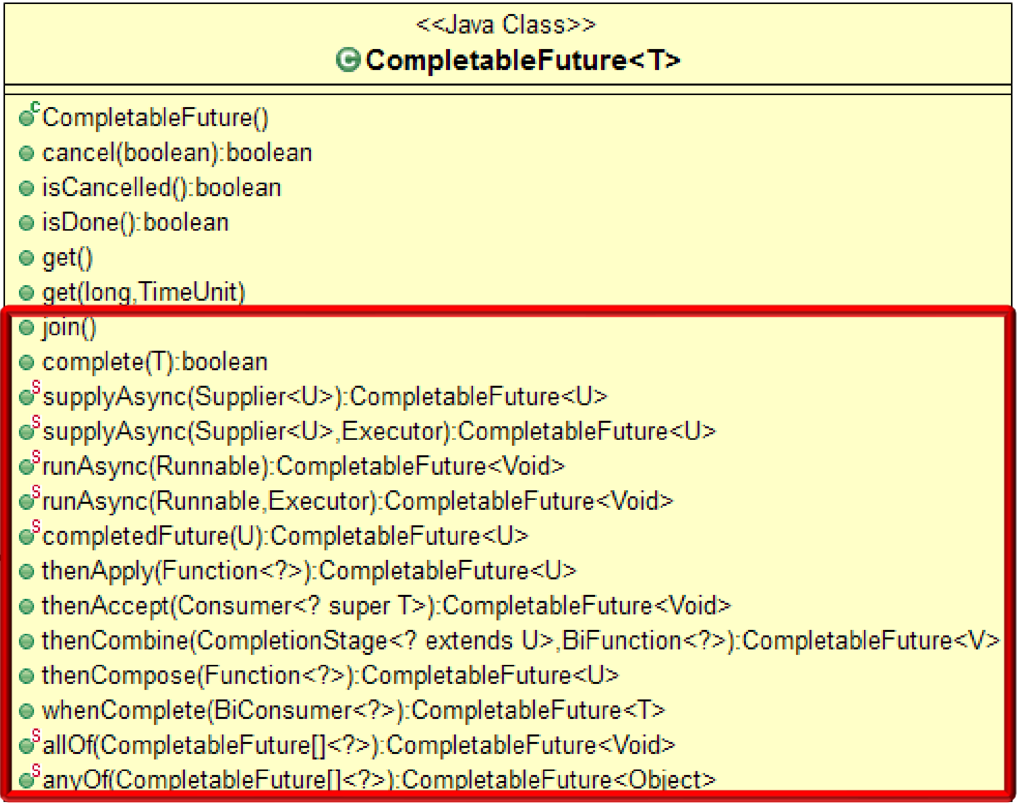
Overview of the Java Future API

- The Java Future interface provides the foundation for the Java CompletableFuture class
  - However, the CompletableFuture class defines dozens of methods & more powerful capabilities



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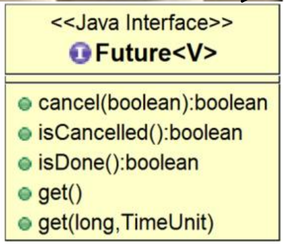

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See upcoming lessons on the completable futures framework

End of Overview of Java Futures