Java Streams: Overview of Spliterators

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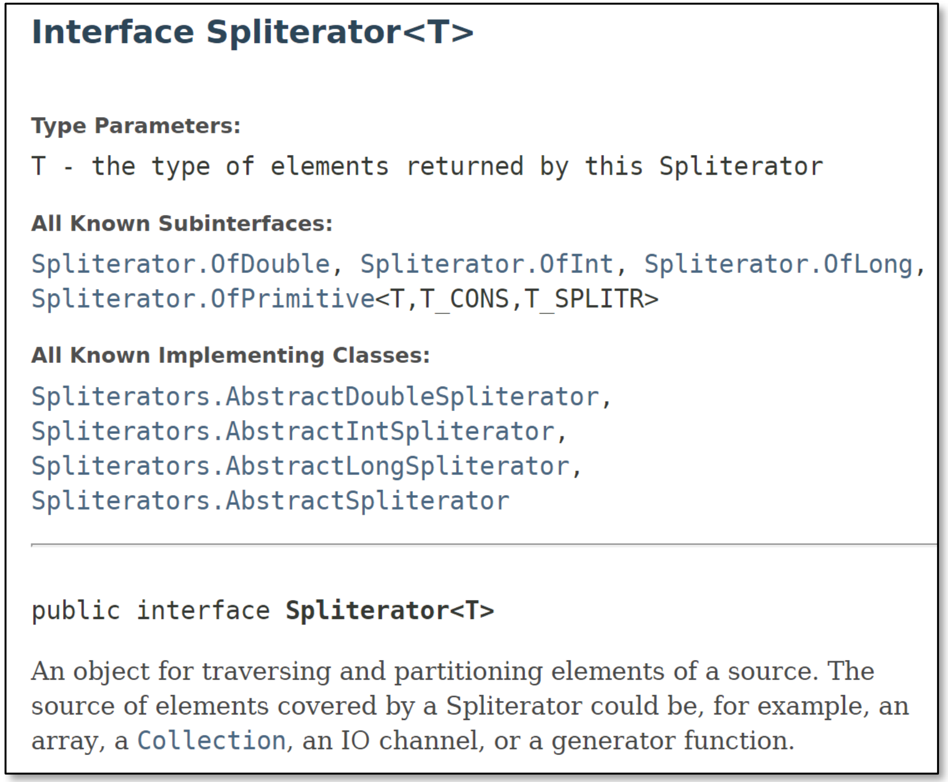
Learning Objectives in this Part of the Lesson

- Understand the structure & functionality of "Splittable iterators" (Spliterators)



Interface Spliterator<T>

Type Parameters:

`T - the type of elements returned by this Spliterator`

All Known Subinterfaces:

`Spliterator.OfDouble, Spliterator.OfInt, Spliterator.OfLong, Spliterator.OfPrimitive<T,T_CONS,T_SPLITR>`

All Known Implementing Classes:

`Spliterators.AbstractDoubleSpliterator, Spliterators.AbstractIntSpliterator, Spliterators.AbstractLongSpliterator, Spliterators.AbstractSpliterator`

```
public interface Spliterator<T>
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An object for traversing and partitioning elements of a source. The source of elements covered by a Spliterator could be, for example, an array, a `Collection`, an IO channel, or a generator function.

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

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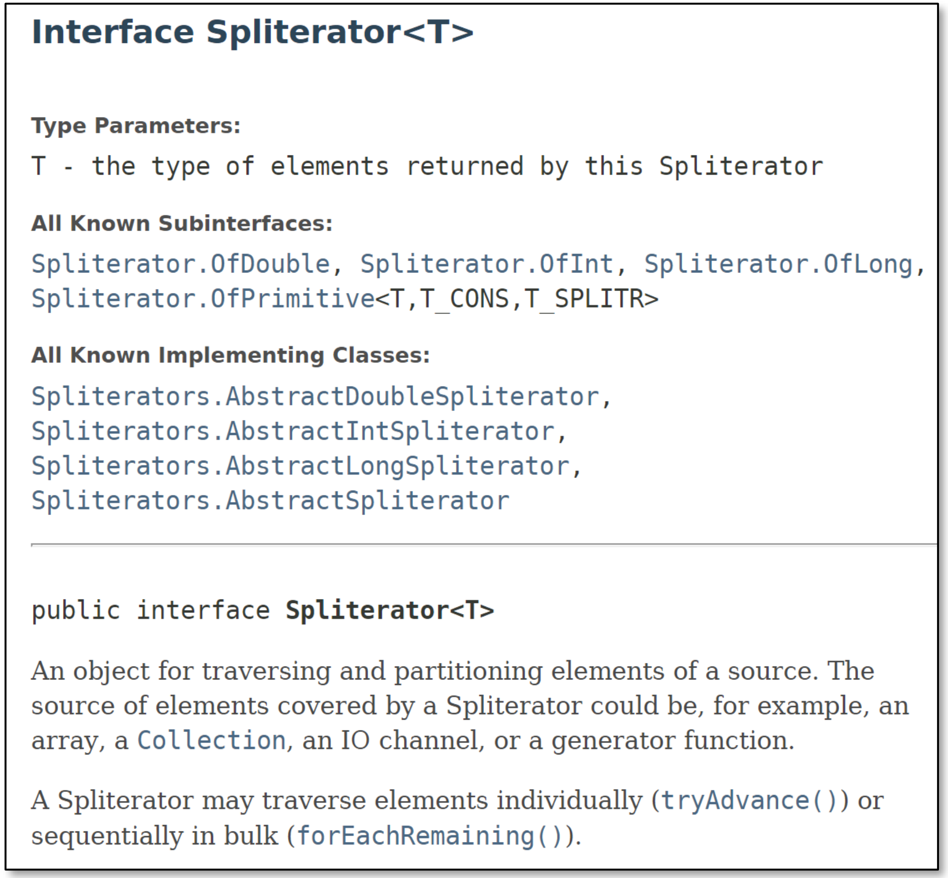

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A Spliterator may traverse elements individually (`tryAdvance()`) or sequentially in bulk (`forEachRemaining()`).

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  - *Iterator* – It can be used to traverse elements of a source
    - e.g., a collection, array, etc.

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List<String> quote = Arrays.asList
    ("This ", "above ", "all- ",
     "to ", "thine ", "own ",
     "self ", "be ", "true", ",\n",
     ...);

for (Spliterator<String> s =
         quote.spliterator();
      s.tryAdvance(System.out::print)
         != false;
      )
    continue;
```

See github.com/douglascraigschmidt/LiveLessons/tree/master/Java8/ex13

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This source is an array/list of strings

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Create a spliterator for the entire array/list

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tryAdvance() combines the hasNext() & next() methods of Iterator

See docs.oracle.com/javase/8/docs/api/java/util/Spliterator.html#tryAdvance

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```

```
boolean tryAdvance(Consumer
          <? super T> action) {
  if (noMoreElementsRemain)
    return false;
  else { ...
    action.accept
              (nextElement);
    return true;
  }
```

See docs.oracle.com/javase/8/docs/api/java/util/Spliterator.html#tryAdvance

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Print value of each string in the quote

Overview of the Java Spliterator

- A Spliterator is a new type of "splittable iterator" in Java 8
  - *Iterator* – It can be used to traverse elements of a source
  - *Split* – It can also partition all elements of a source

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firstHalf.forEachRemaining
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trySplit() returns a spliterator covering elements that will no longer be covered by the invoking spliterator

See docs.oracle.com/javase/8/docs/api/java/util/Spliterator.html#trySplit

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Spliterator<T> trySplit() {
  if (input <= minimum size)
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  else {
    split input in 2 chunks
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trySplit() is called recursively until all chunks are <= to the minimize size

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Ideally a spliterator splits the original input source in half!

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The "right chunk" is defined by updating the state of this spliterator object

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The "left chunk" is defined by creating/returning a new spliterator object

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Performs the action for each element in the spliterator

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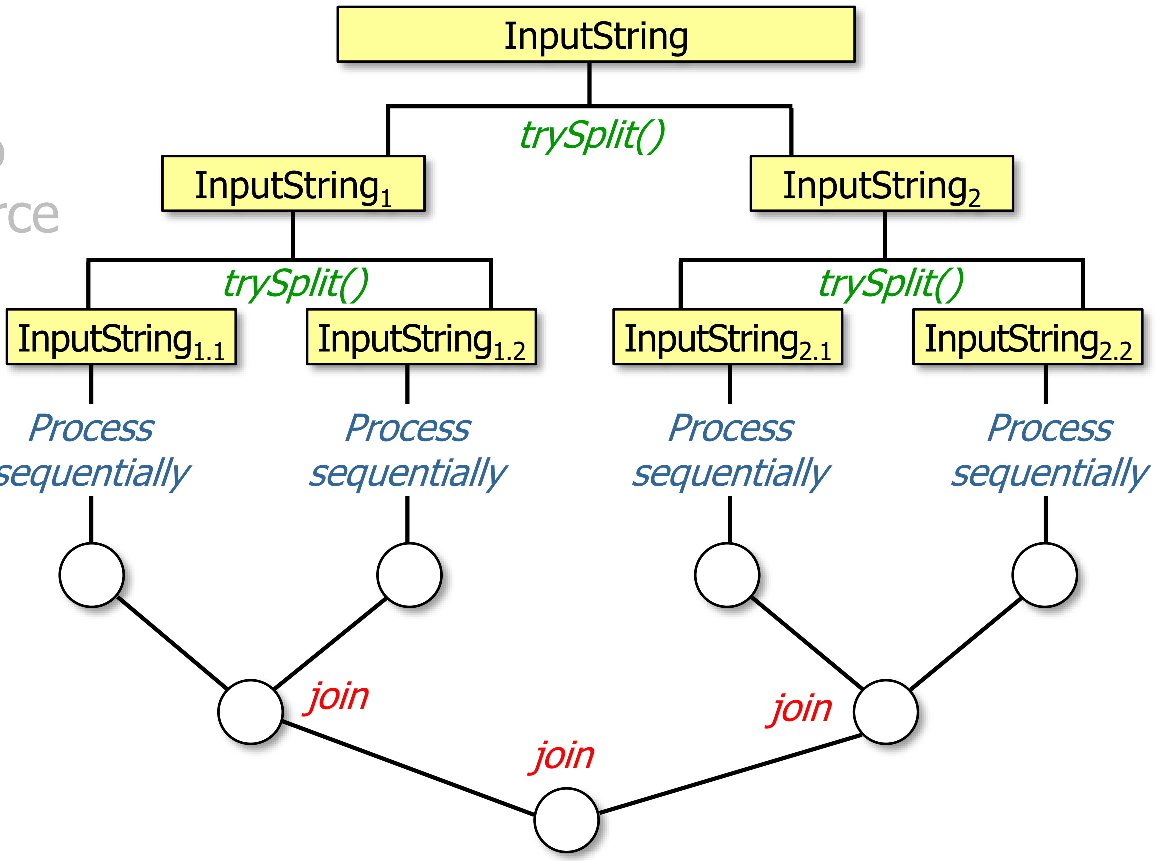
    - Mostly used with Java 8 parallel streams



See blog.logentries.com/2015/10/java-8-introduction-to-parallelism-and-spliterator

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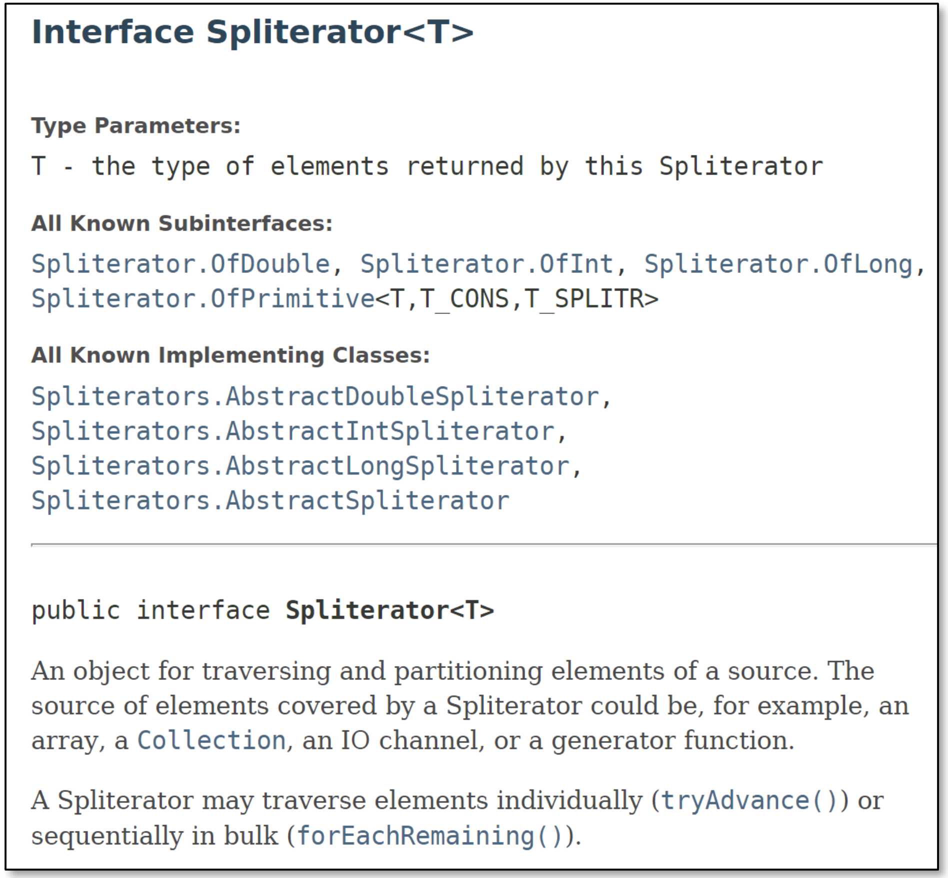

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We focus on traversal now & on partitioning later when covering parallel streams

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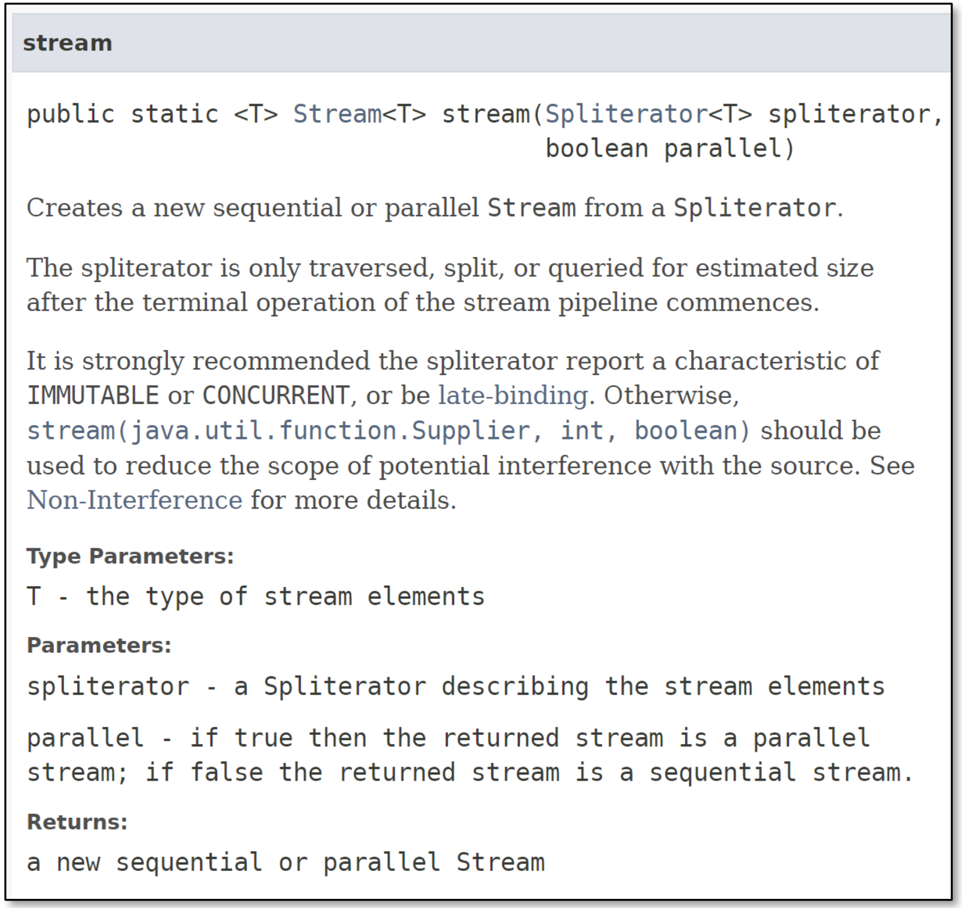
- The StreamSupport.stream() factory method creates a new sequential or parallel stream from a spliterator



stream

```
public static <T> Stream<T> stream(Spliterator<T> spliterator,
                                   boolean parallel)
```

Creates a new sequential or parallel `Stream` from a `Spliterator`.

The spliterator is only traversed, split, or queried for estimated size after the terminal operation of the stream pipeline commences.

It is strongly recommended the spliterator report a characteristic of `IMMUTABLE` or `CONCURRENT`, or be late-binding. Otherwise, `stream(java.util.function.Supplier, int, boolean)` should be used to reduce the scope of potential interference with the source. See Non-Interference for more details.

Type Parameters:

`T` - the type of stream elements

Parameters:

`spliterator` - a `Spliterator` describing the stream elements

`parallel` - if `true` then the returned stream is a parallel stream; if `false` the returned stream is a sequential stream.

Returns:

a new sequential or parallel `Stream`

See docs.oracle.com/javase/8/docs/api/java/util/stream/StreamSupport.html#stream

Overview of the Java Spliterator

- The StreamSupport.stream() factory method creates a new sequential or parallel stream from a spliterator
  - e.g., the Collection interface defines two default methods using this capability

```
public interface Collection<E>
       extends Iterable<E> {
  ...
  default Stream<E> stream() {
    return StreamSupport
      .stream(spliterator(),
              false);
  }

  default Stream<E>
    parallelStream() {
    return StreamSupport
      .stream(spliterator(),
              true);
  }
```

See jdk8/jdk8/jdk/file/tip/src/share/classes/java/util/Collection.java

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The 'false' parameter creates a sequential stream, whereas 'true' creates a parallel stream

End of Java 8 Streams: Overview of Spliterators