Overview of Java 8 Streams (Part 2)

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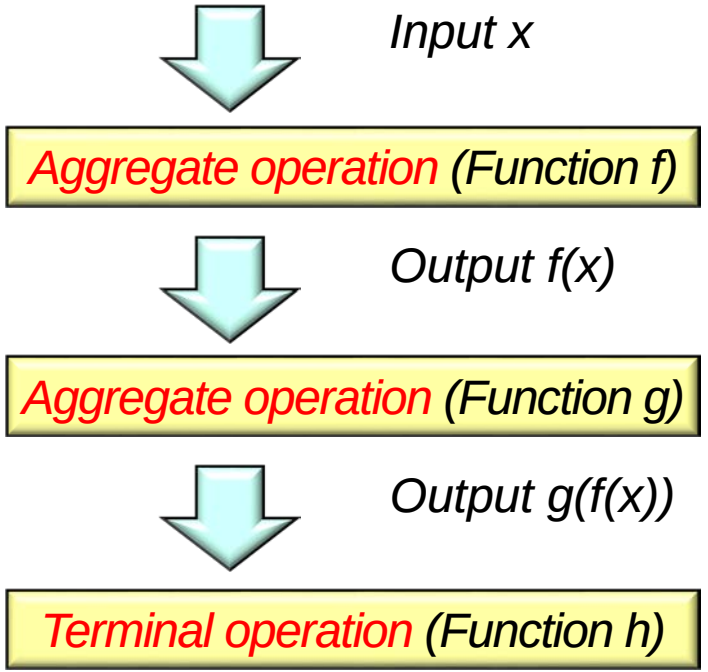
Learning Objectives in this Part of the Lesson

- Understand the structure & functionality of Java 8 streams, e.g.,
  - Fundamentals of streams
  - Common stream aggregate operations



Learning Objectives in this Part of the Lesson

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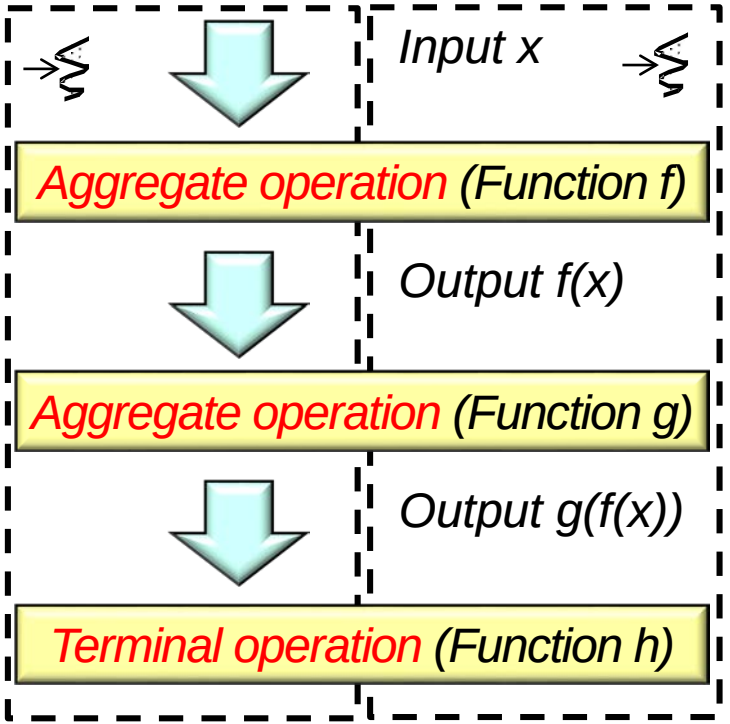
  - Common stream aggregate operations
    - These operations apply to both sequential & parallel streams



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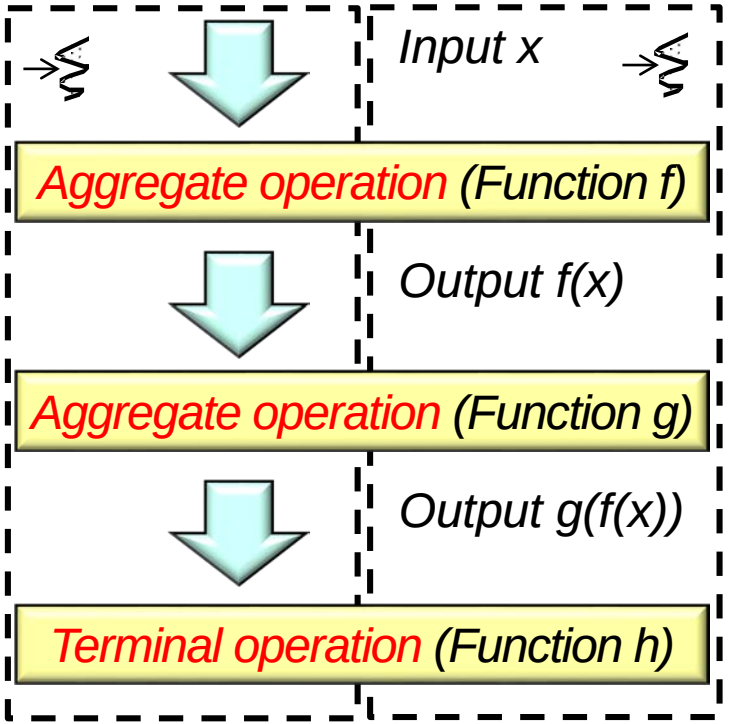

Being a good streams programmer makes you a better parallel streams programmer

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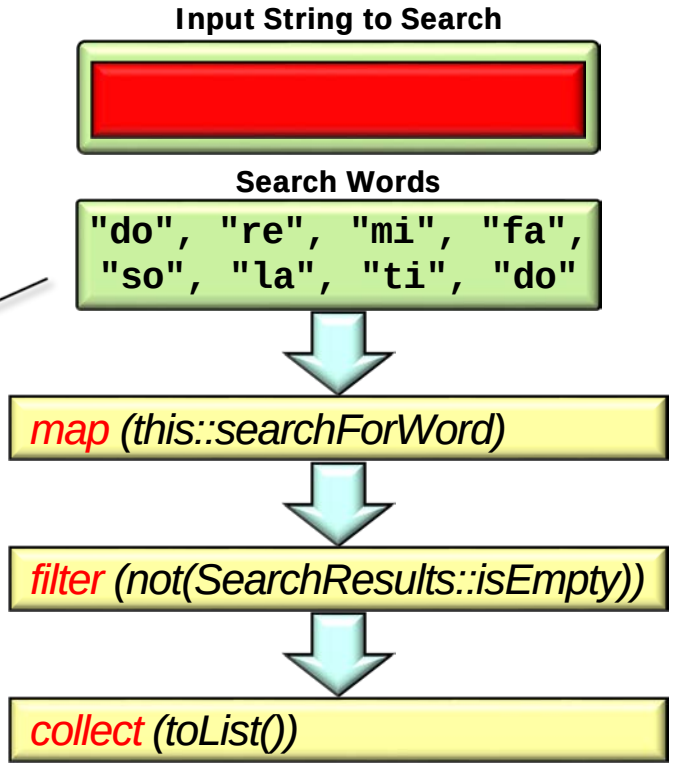
We'll use a simple sequential stream example to explain common Java 8 aggregate operations



See github.com/douglascraigschmidt/LiveLessons/tree/master/SimpleSearchStream

Overview of SimpleSearch Stream Example

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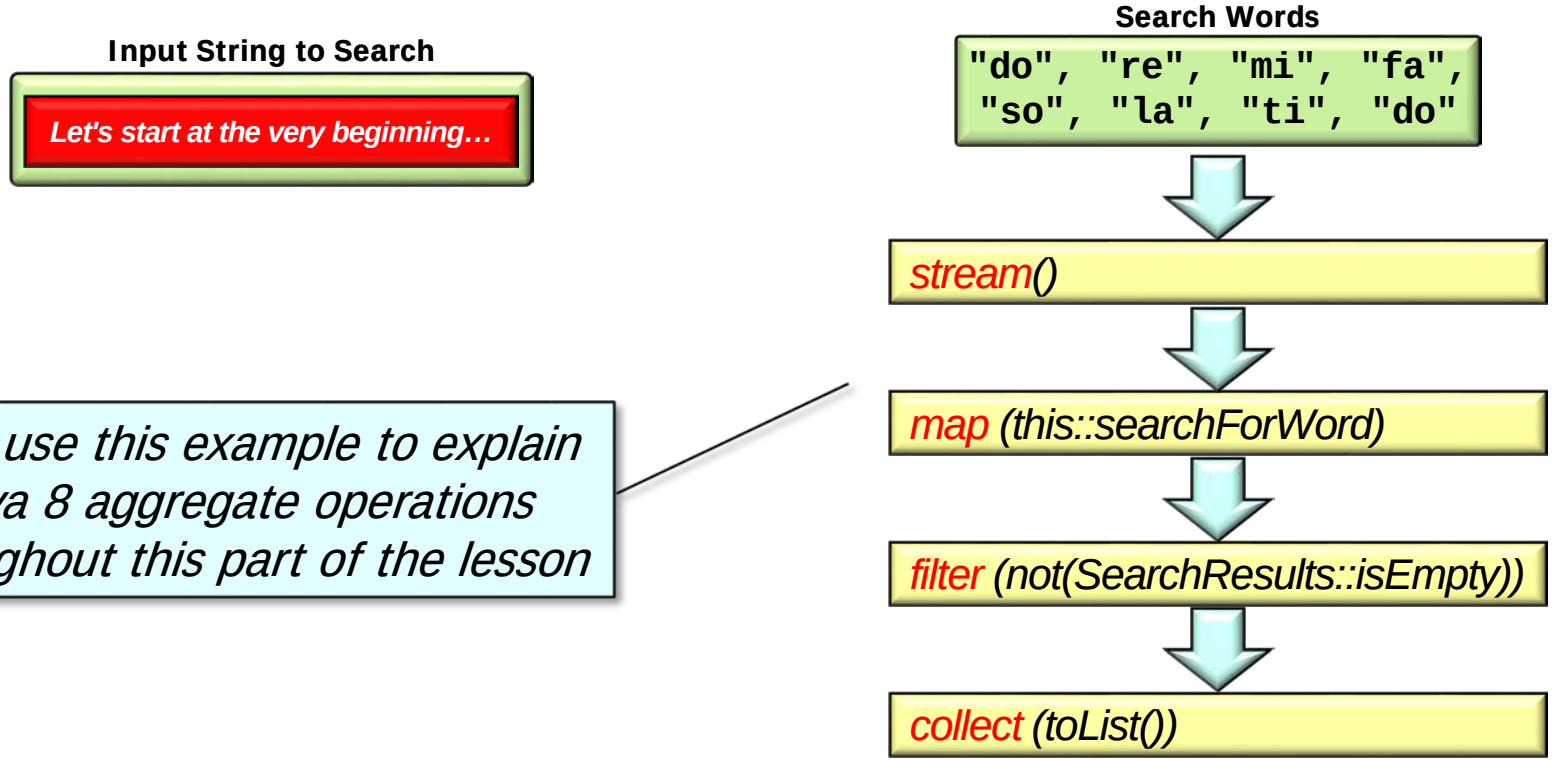
- This example finds words in an input string



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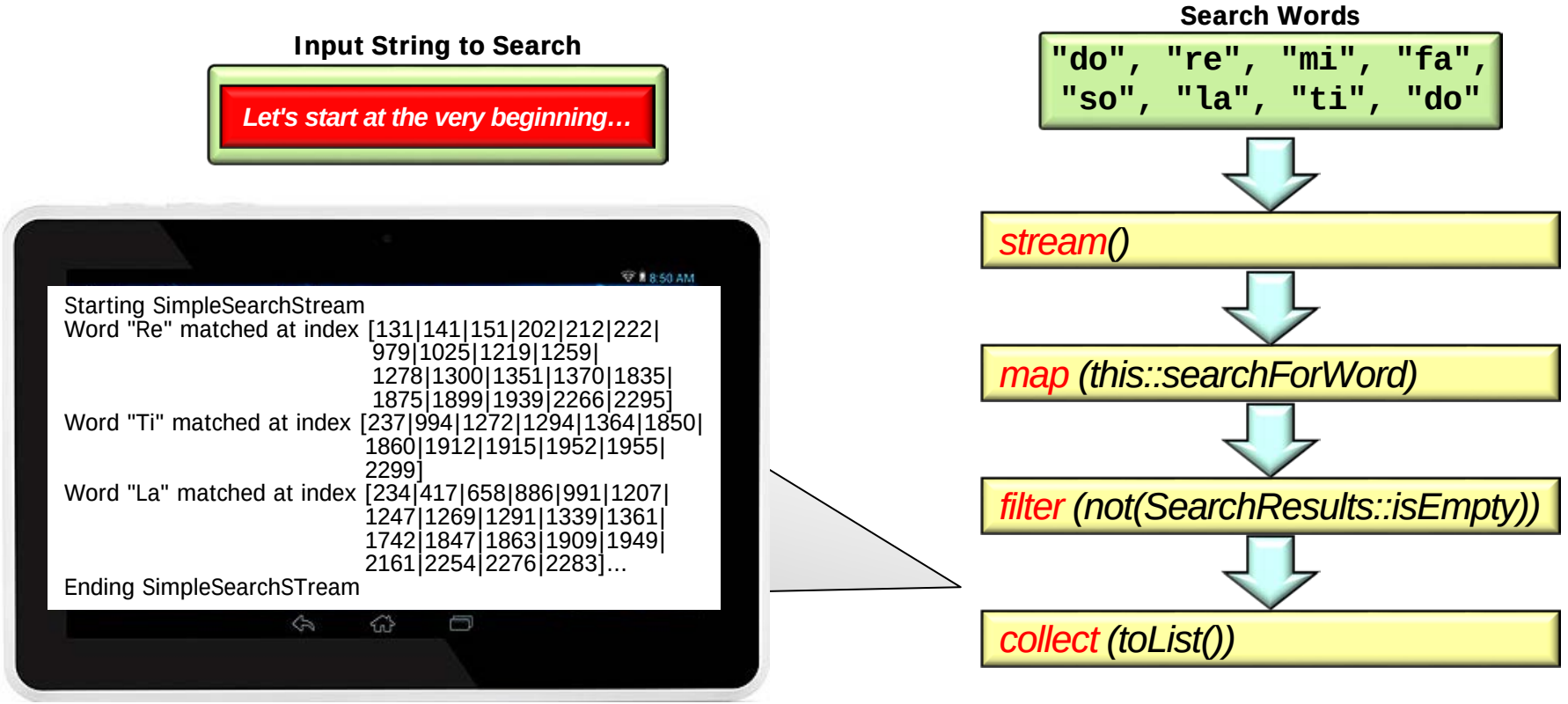

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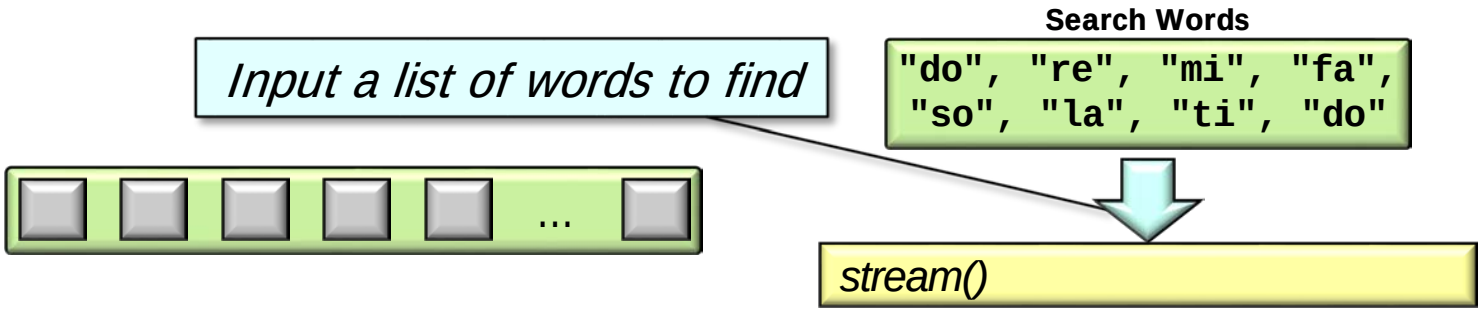

Overview of SimpleSearchStream Example

- This example finds words in an input string

List
<String>

Search Words

```
"do", "re", "mi", "fa",
"so", "la", "ti", "do"
```

stream()

Convert collection to a (sequential) stream

Overview of SimpleSearchStream Example

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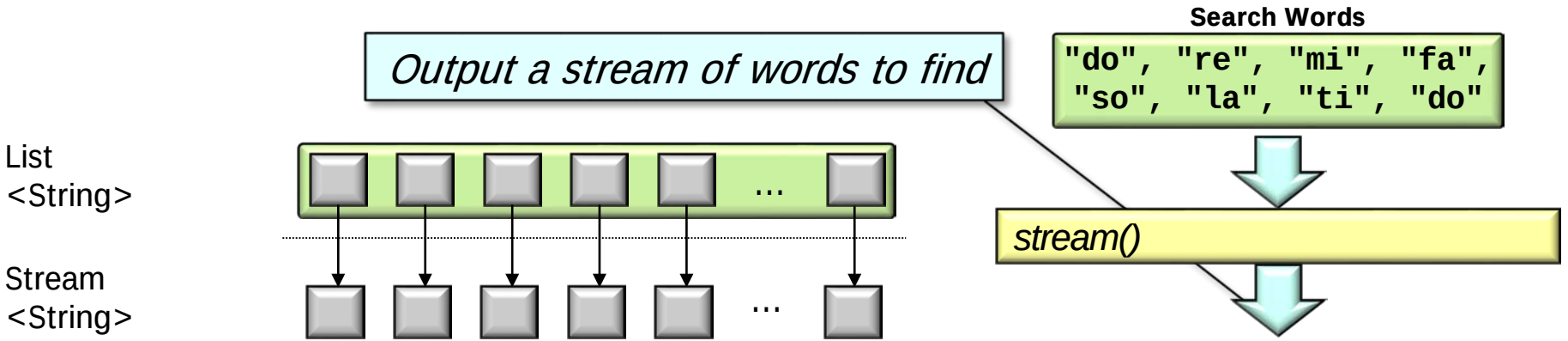

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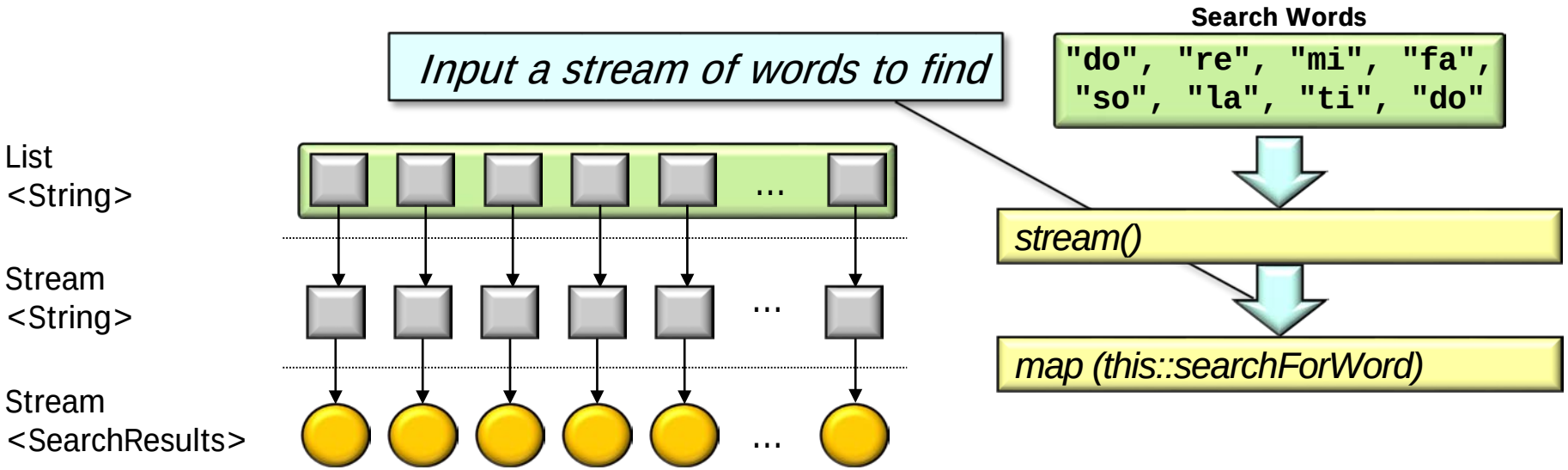

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List
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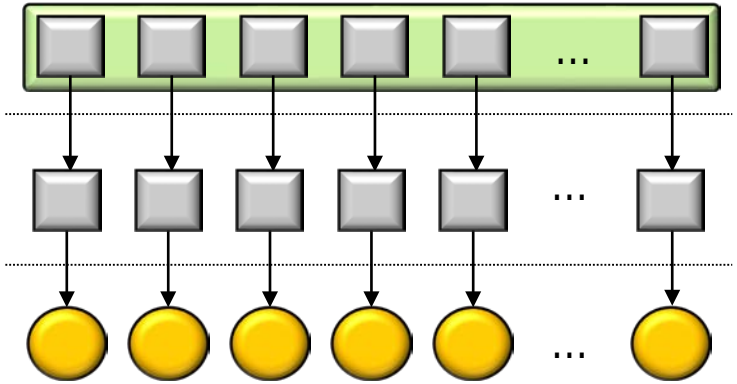
Stream
<String>

Stream
<SearchResults>



Search Words

```
"do", "re", "mi", "fa",
"so", "la", "ti", "do"
```

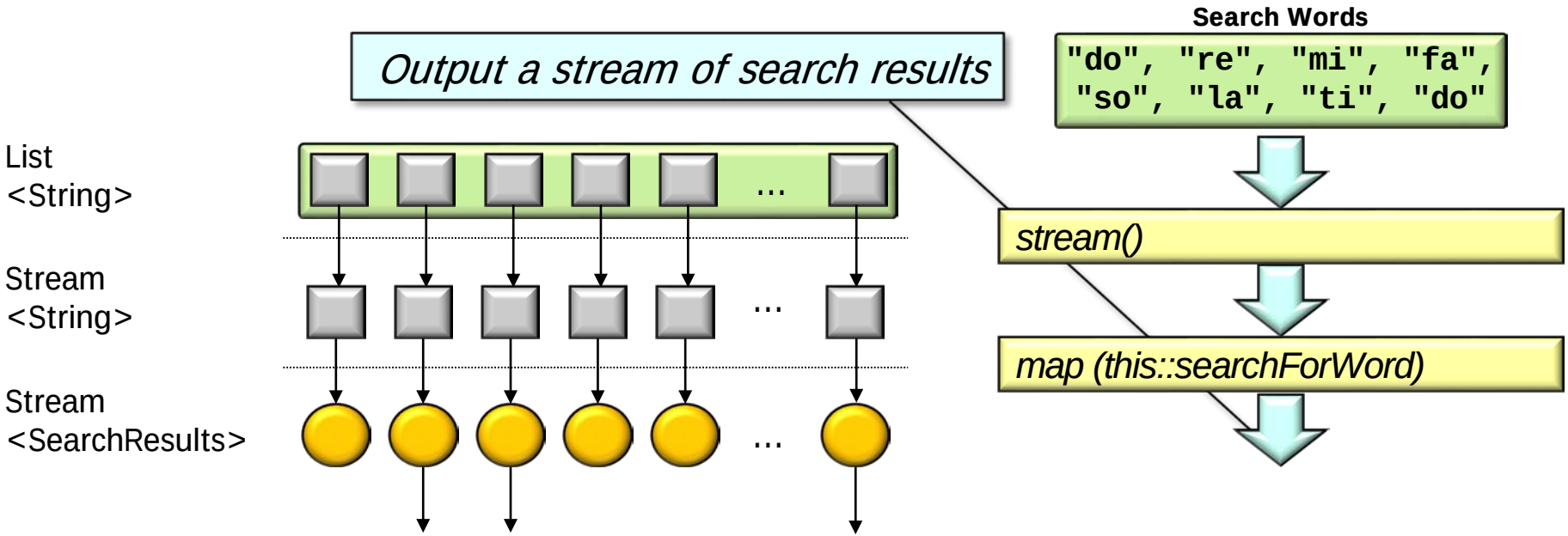
stream()

map (this::searchForWord)

Search for the word in each input string

Overview of SimpleSearchStream Example

- This example finds words in an input string



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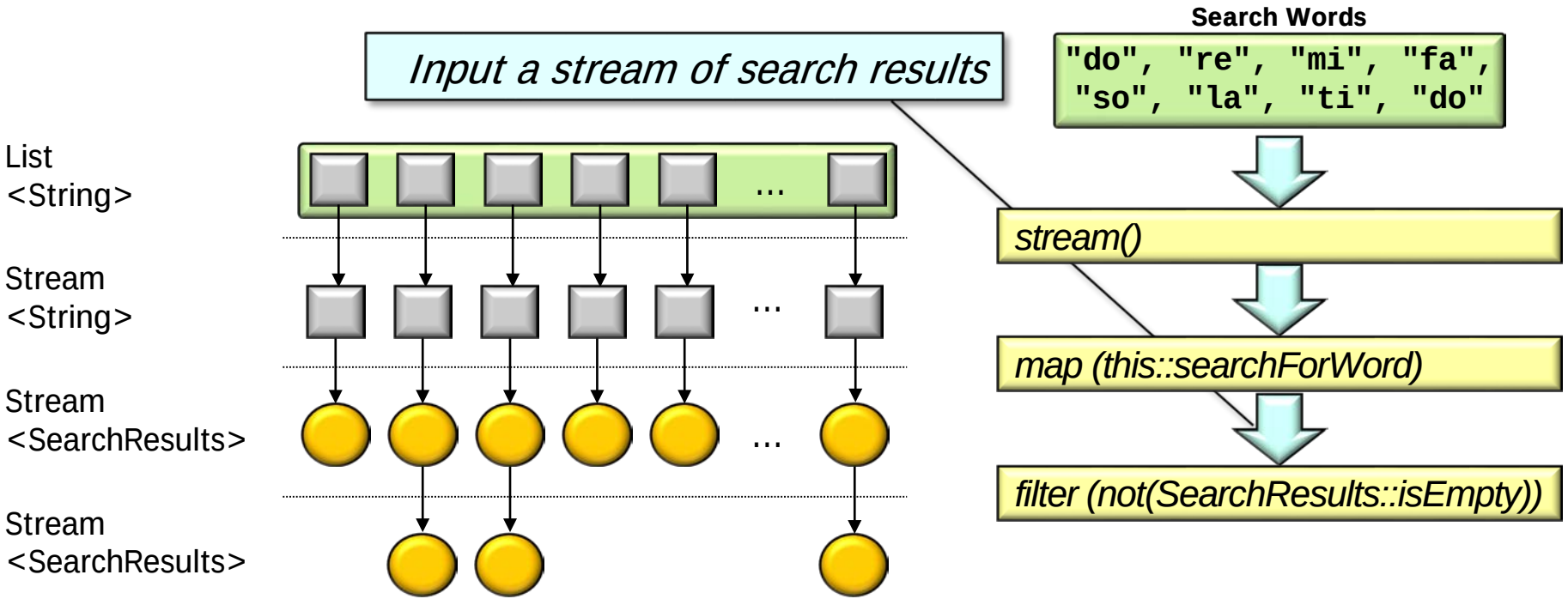

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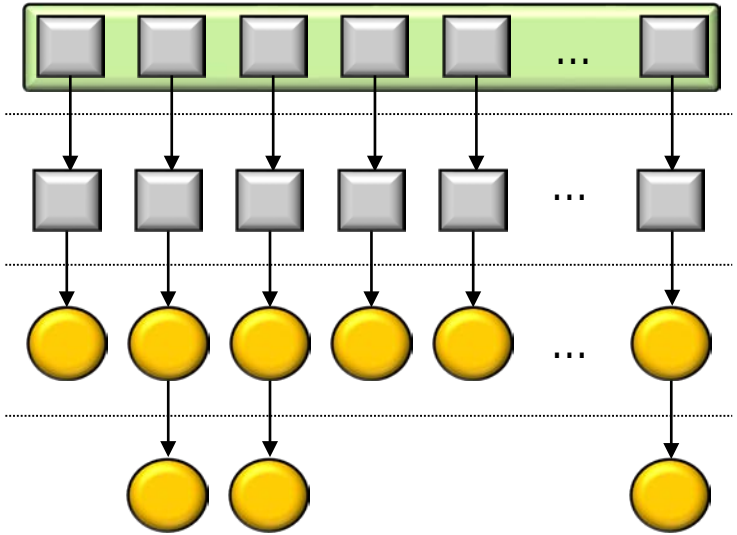

Search Words

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"do", "re", "mi", "fa",
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stream()

map (this::searchForWord)

filter (not(SearchResults::isEmpty))

Remove empty search results from the stream

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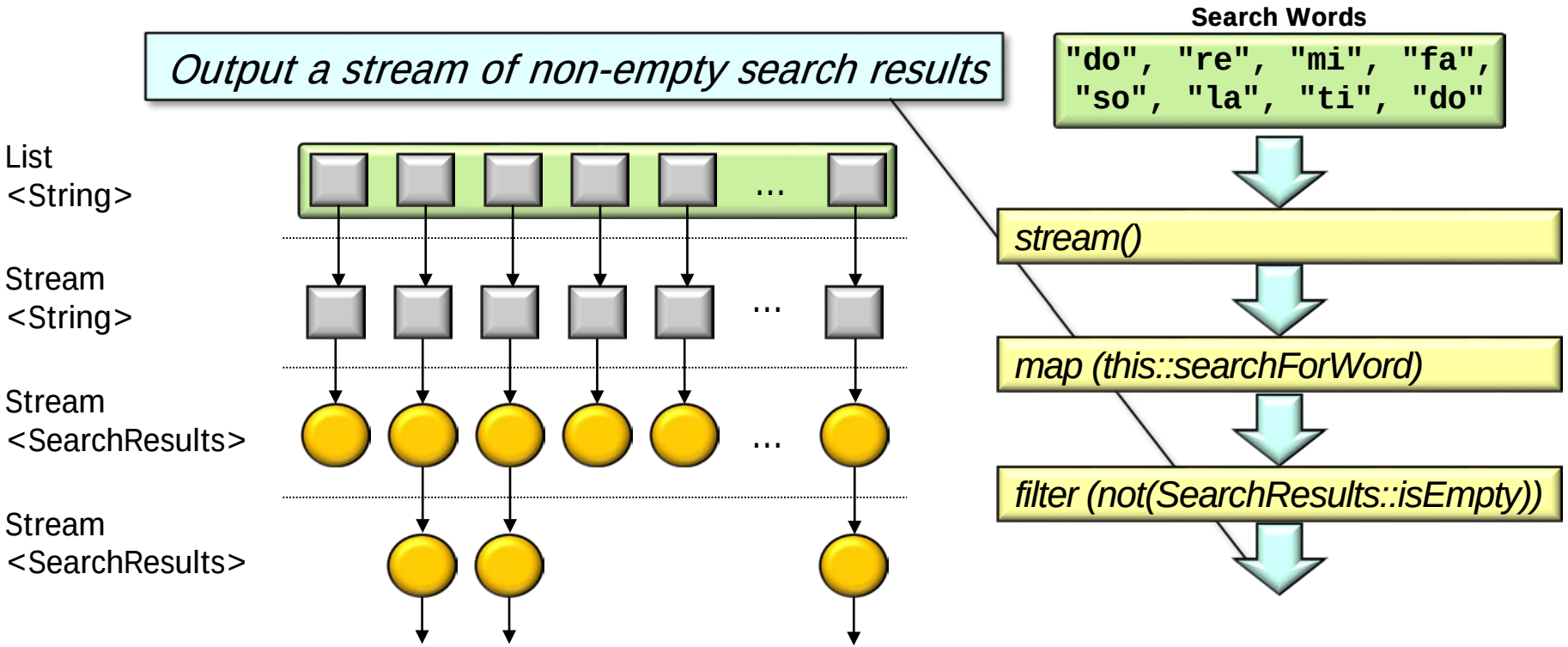

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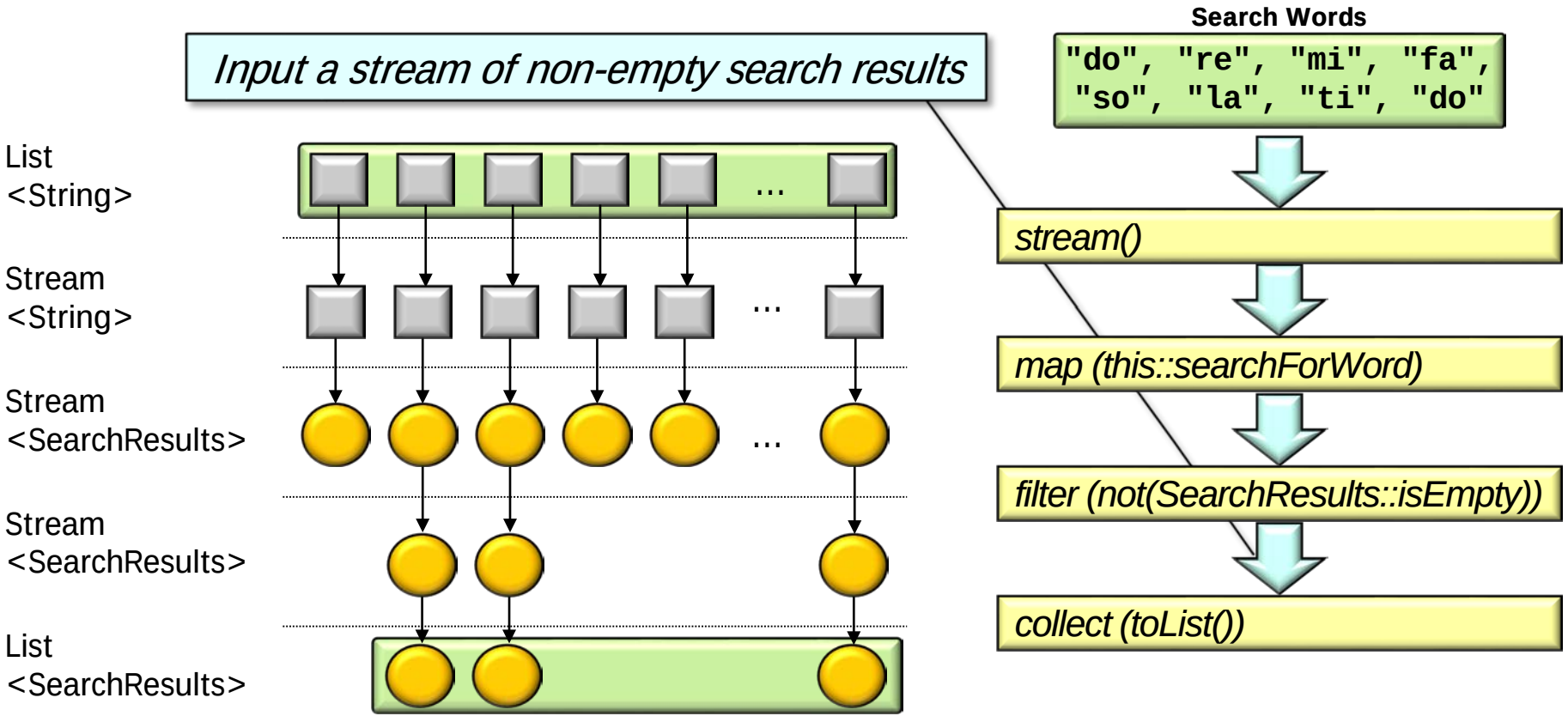

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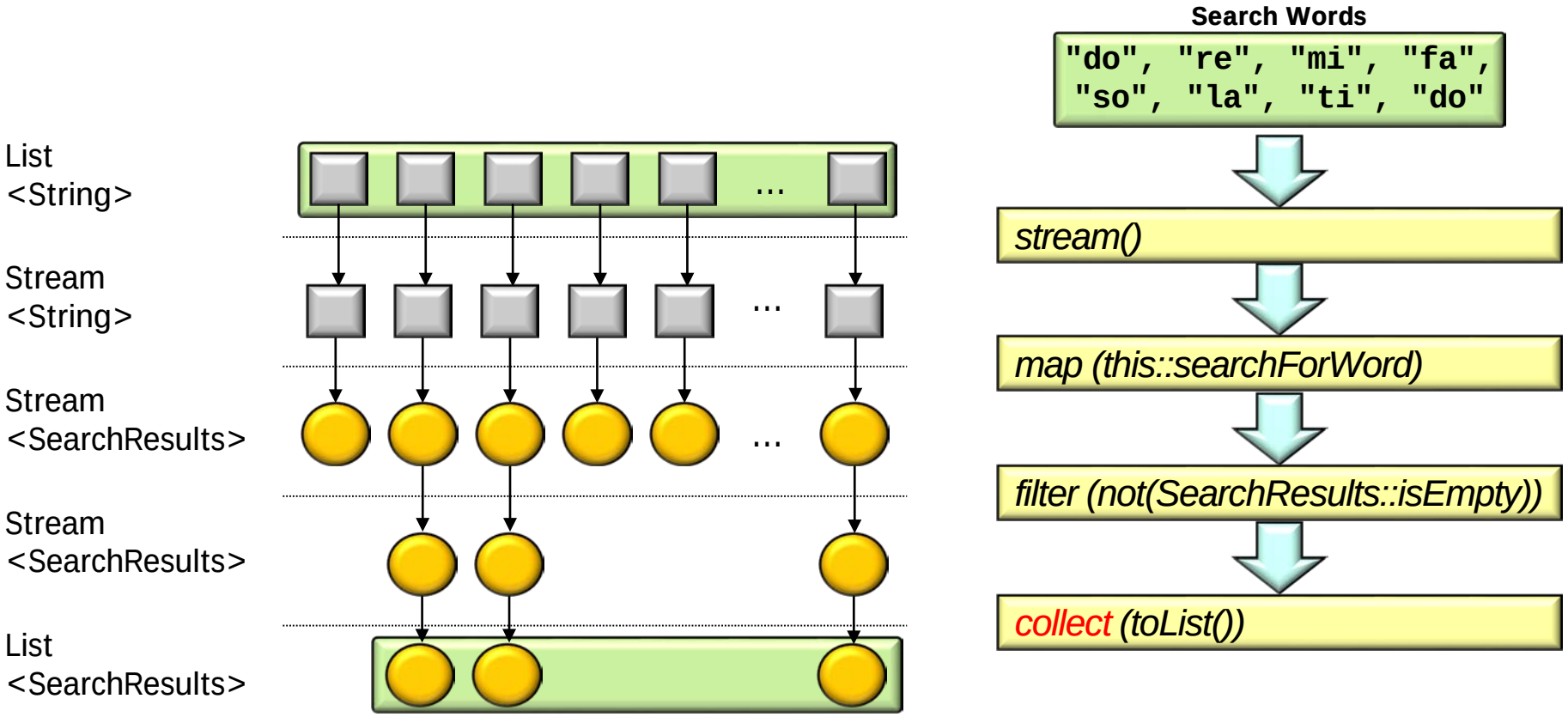


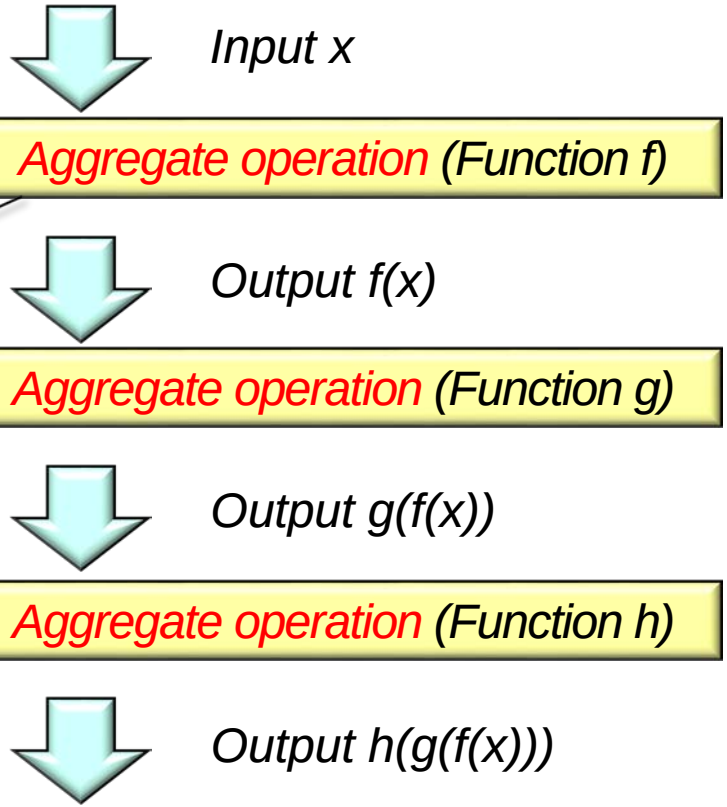
Trigger intermediate operation processing & return a list of SearchResults

Overview of Common Stream Aggregate Operations

Overview of Common Stream Aggregate Operations

- An aggregate operation processes all elements in a stream

An aggregate operation is a higher-order function that applies a "behavior" (e.g., function or predicate) parameter to every element in a stream



See en.wikipedia.org/wiki/Higher-order_function

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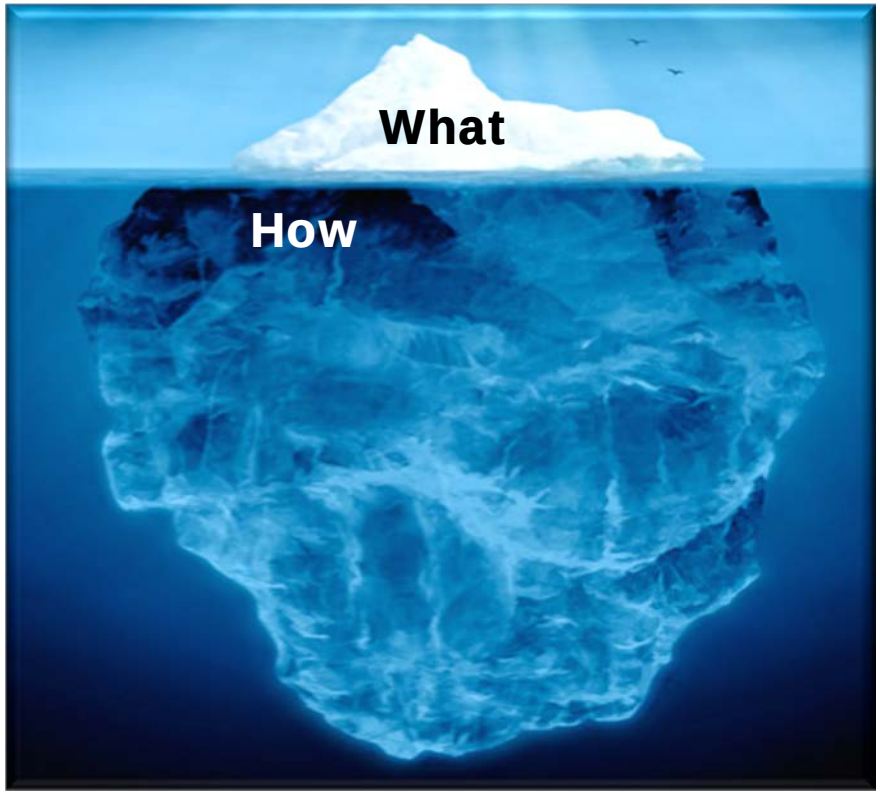

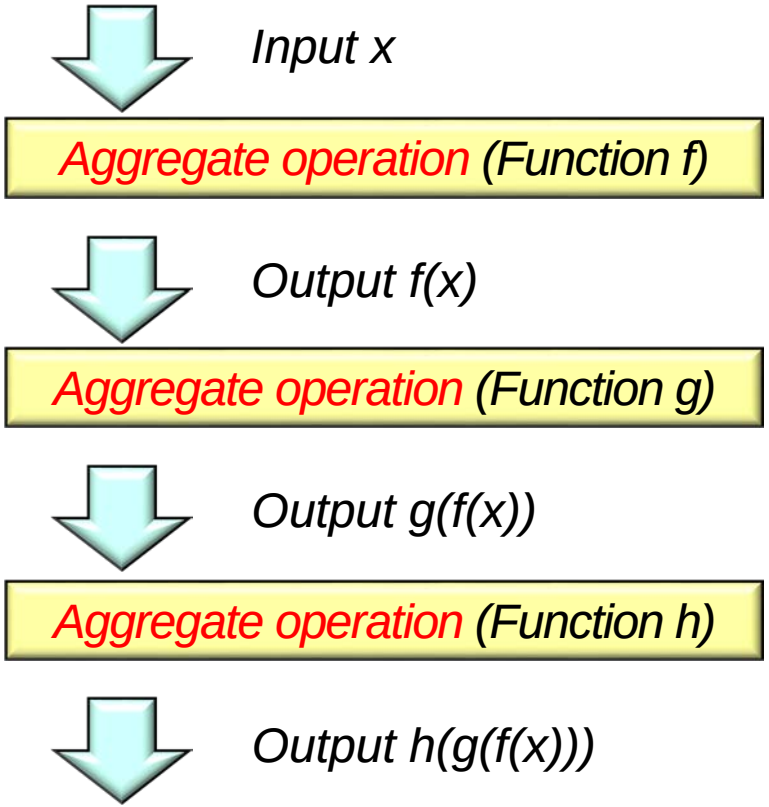

The focus is on the “what” (declarative), *not* the “how” (imperative)

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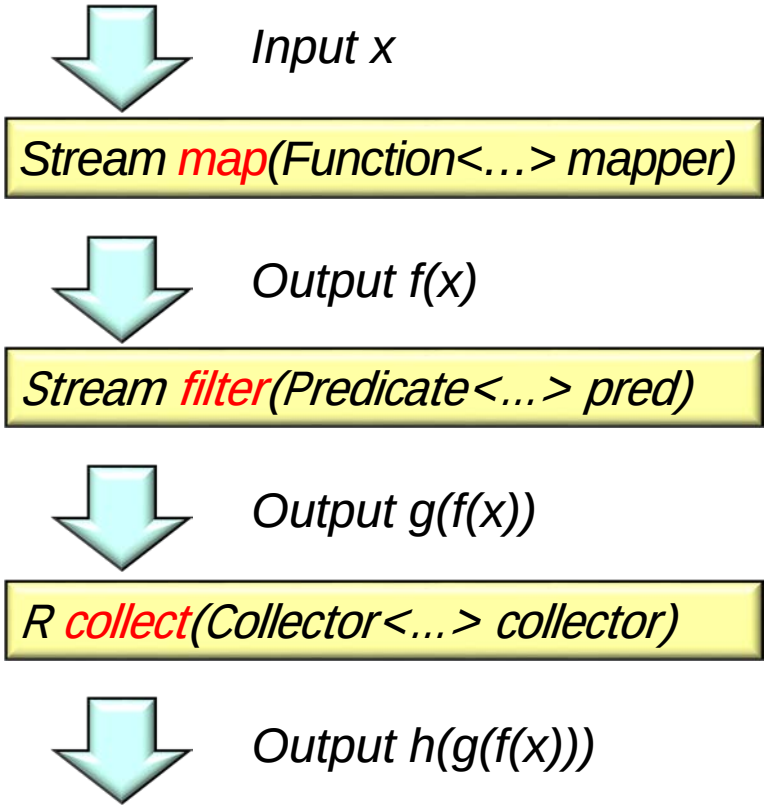

Common aggregate operations include map(), filter(), & collect()

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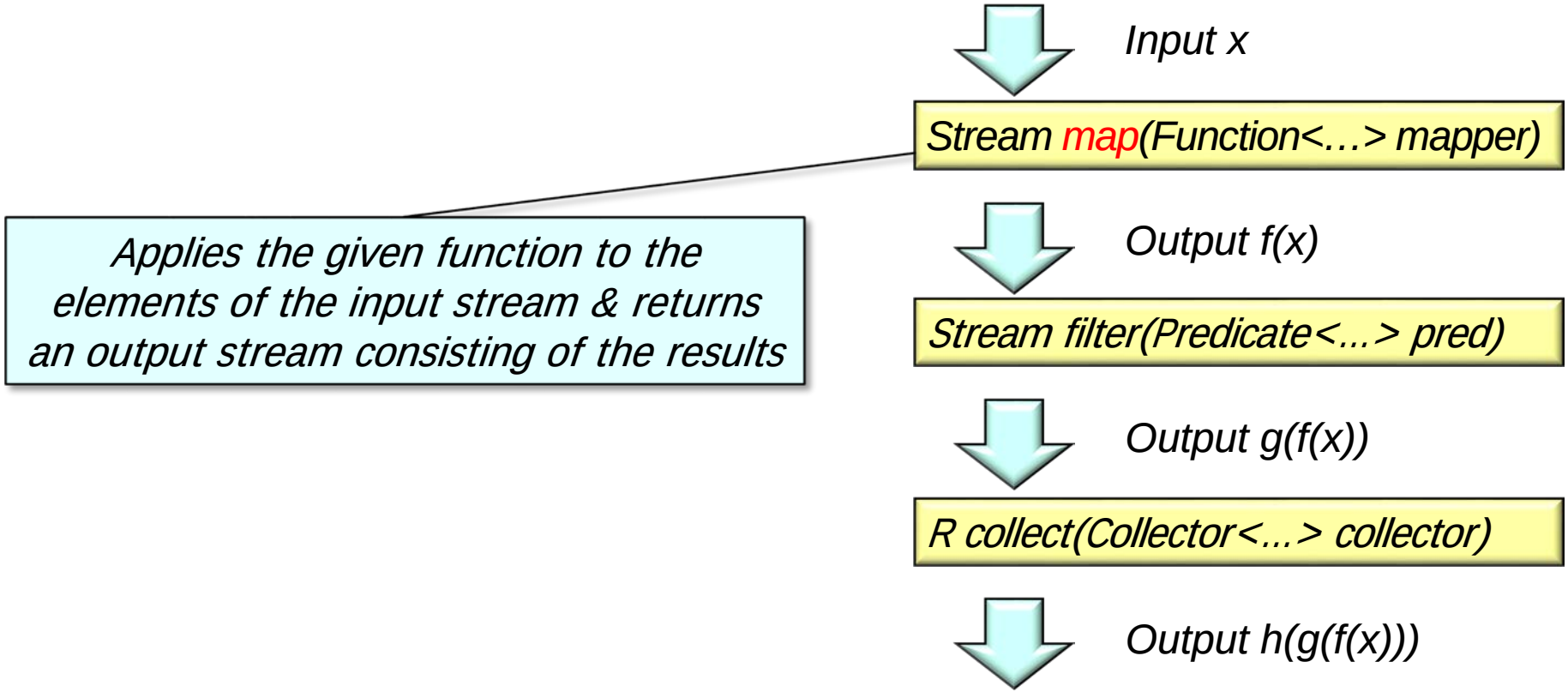

See docs.oracle.com/javase/8/docs/api/java/util/stream/Stream.html#map

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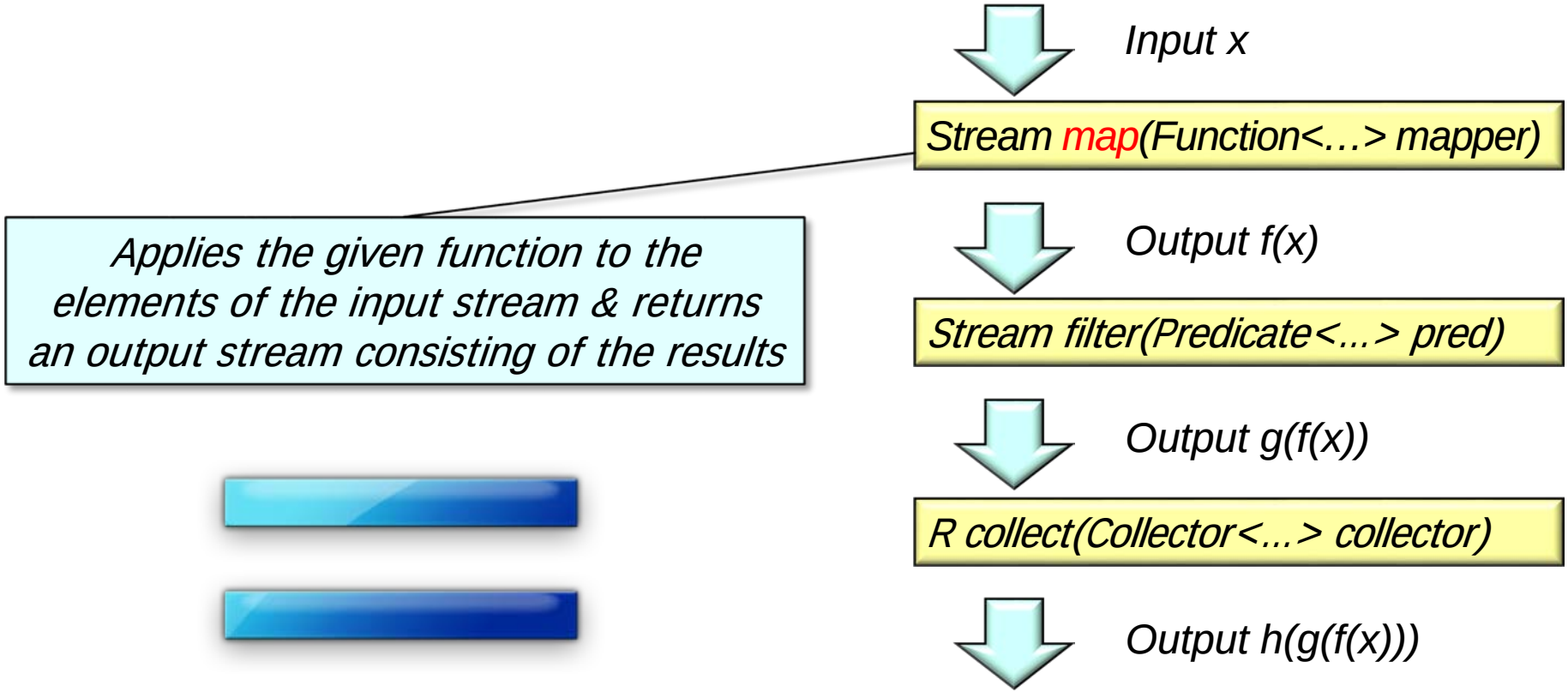

The # of output stream elements matches the # of input stream elements

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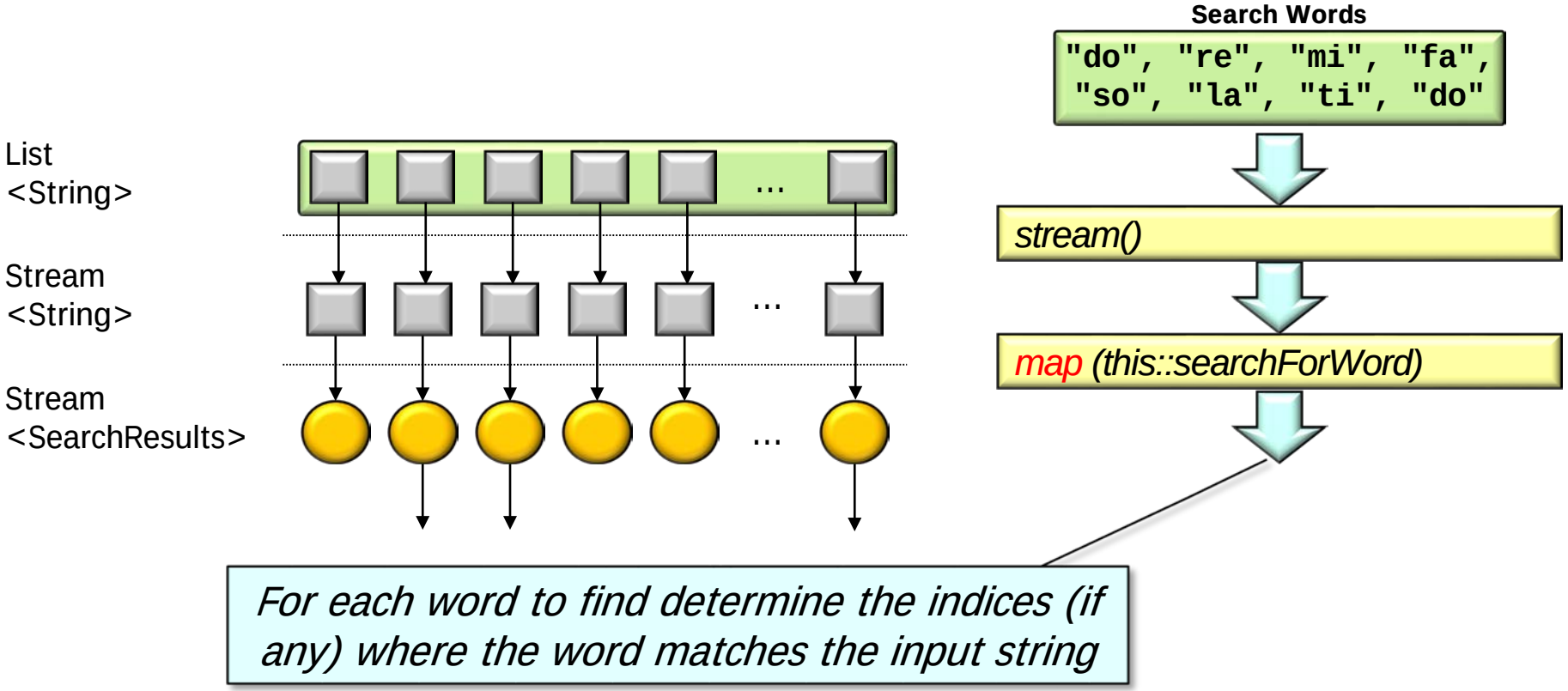

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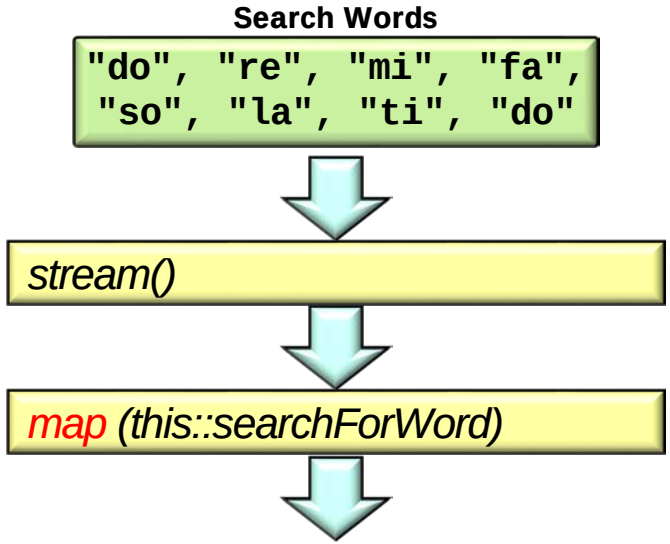

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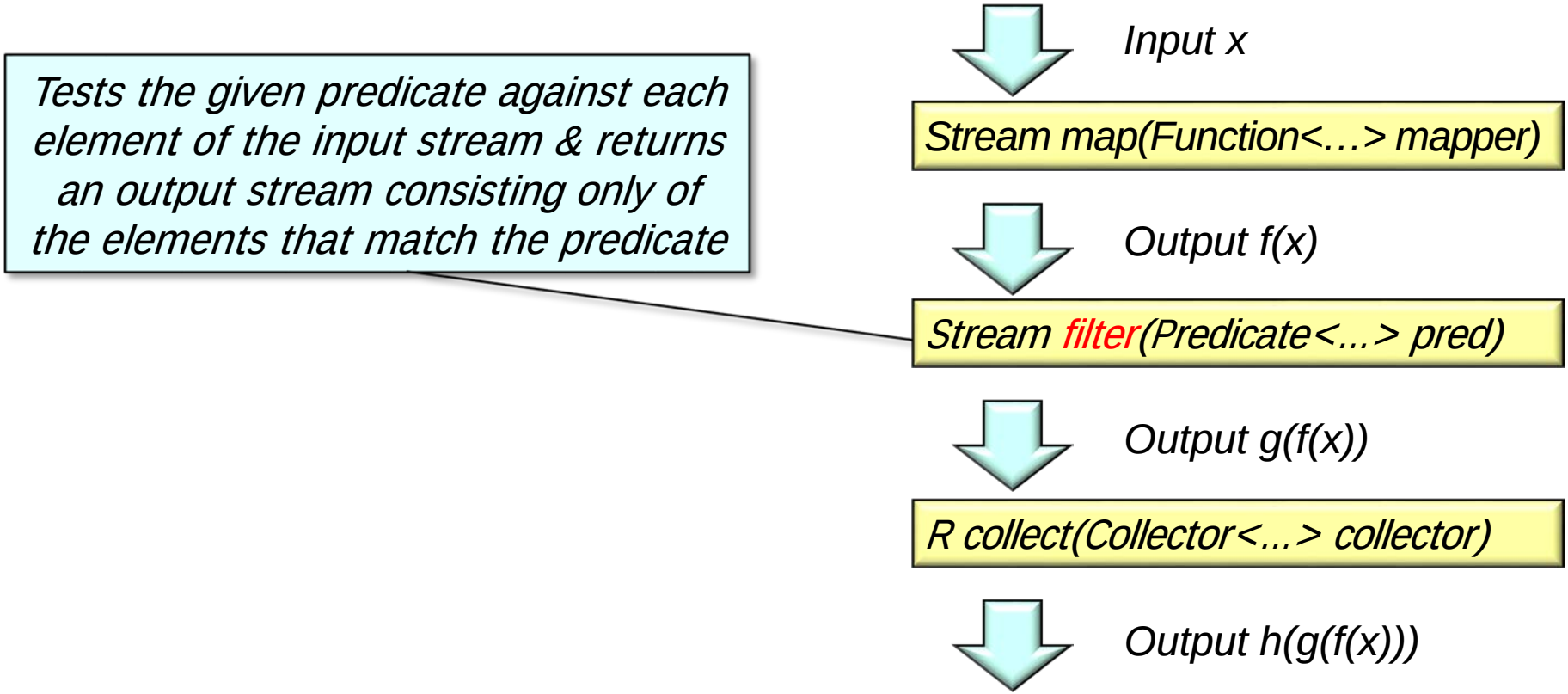

See docs.oracle.com/javase/8/docs/api/java/util/stream/Stream.html#filter

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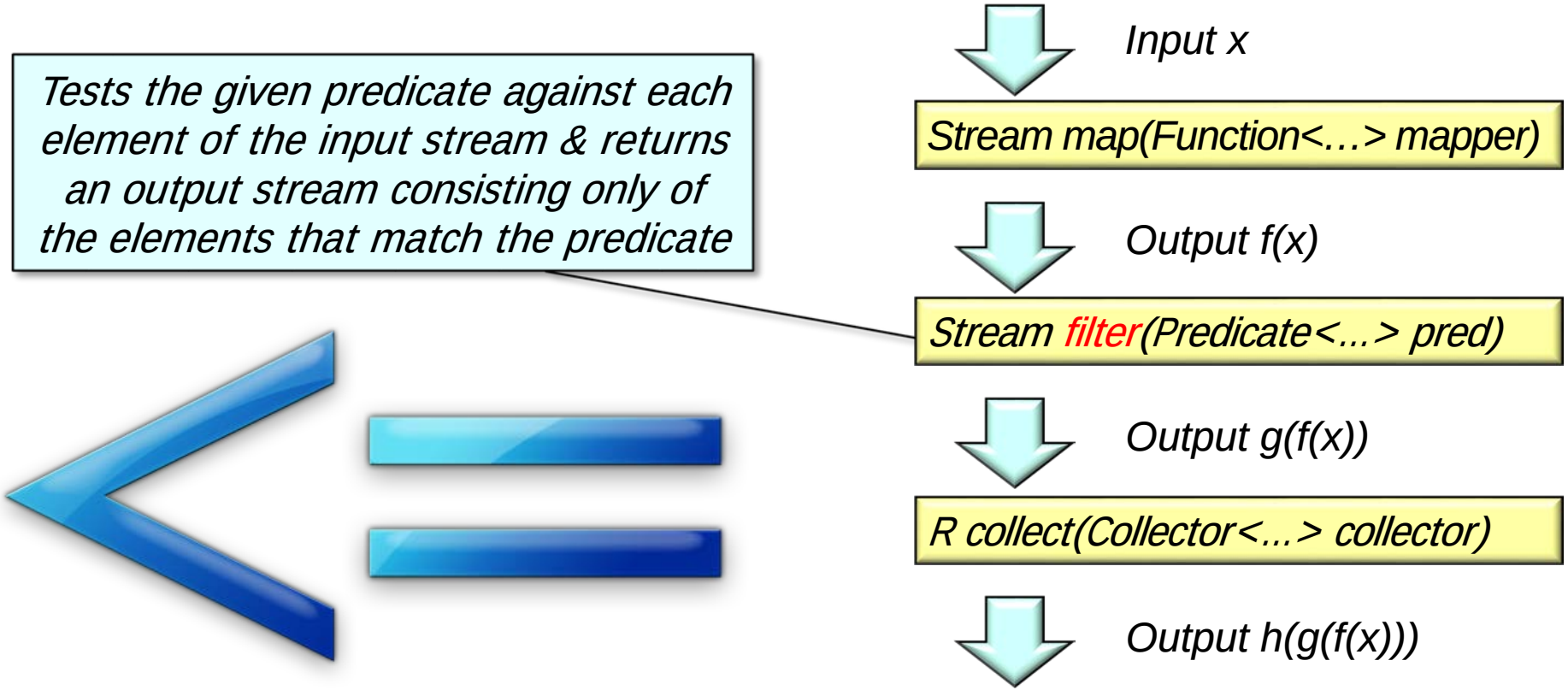

The # of output stream elements may be less than the # of input stream elements

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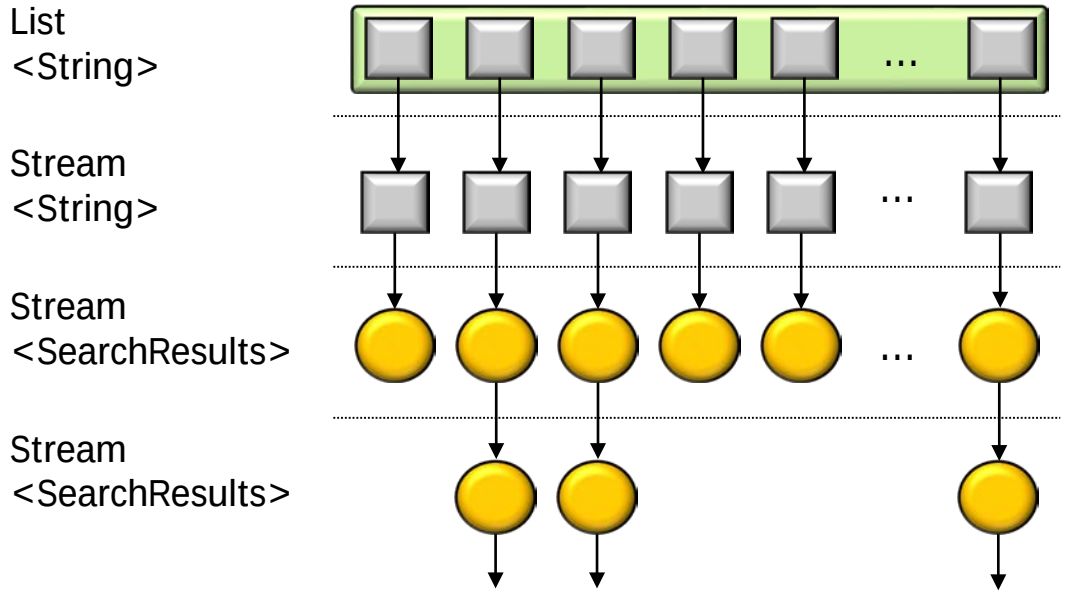

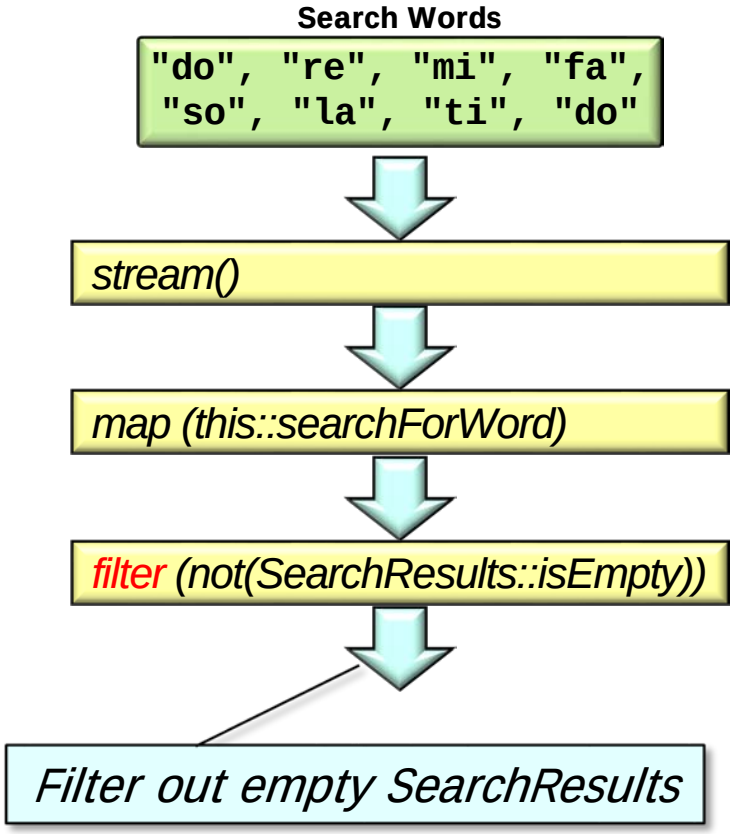

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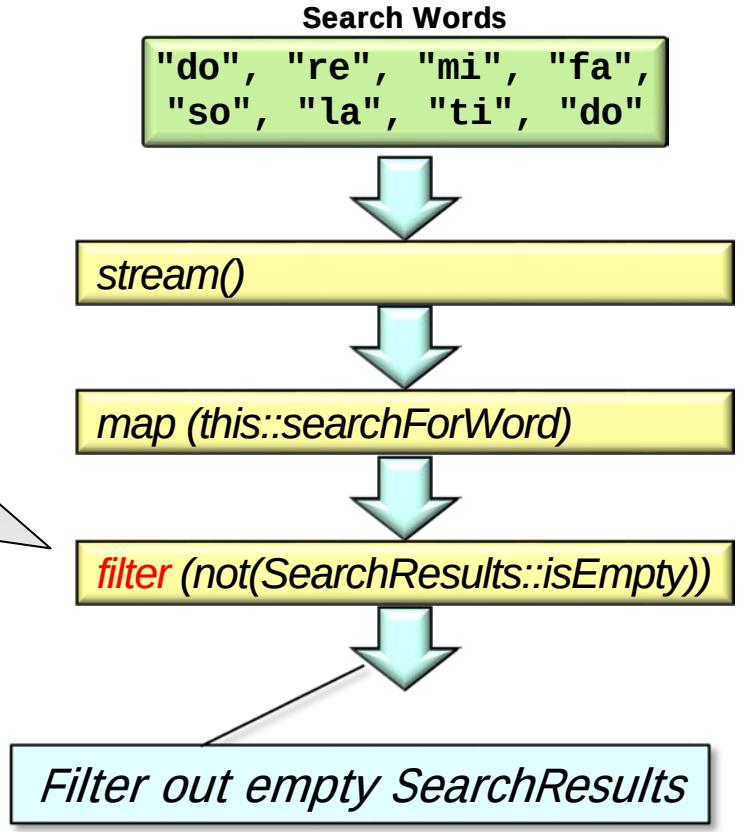

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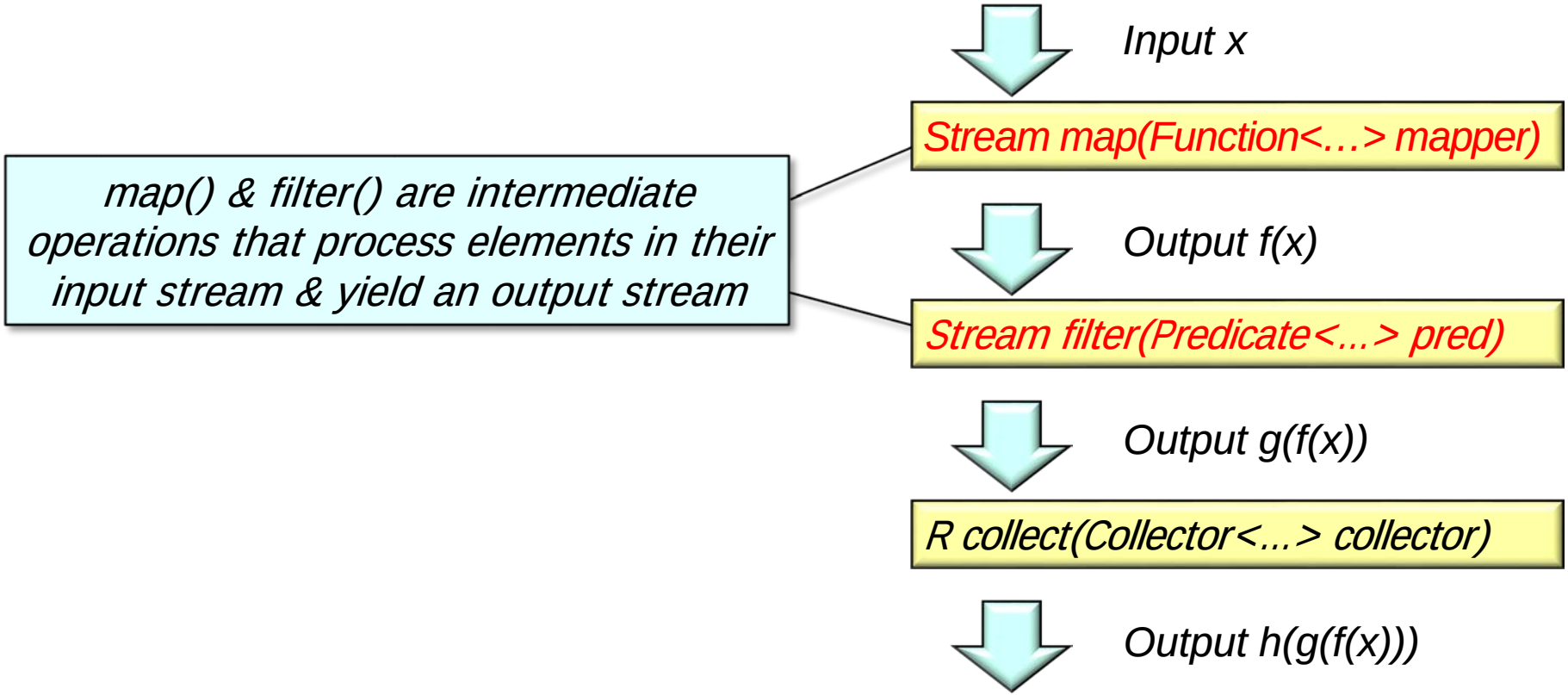


Overview of Common Stream Aggregate Operations

- An aggregate operation processes all elements in a stream

Input x

Stream map(Function<…> mapper)

Output f(x)

Stream filter(Predicate<...> pred)

Output g(f(x))

R collect(Collector<...> collector)

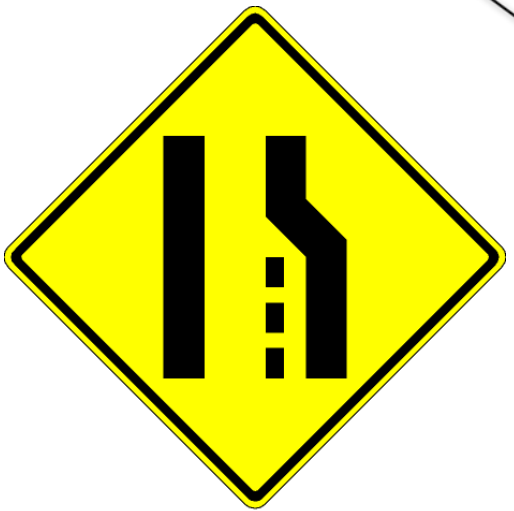
Output h(g(f(x)))

Intermediate operations are “lazy” & don’t run until a terminal operator is reached

Overview of Common Stream Aggregate Operations

- An aggregate operation processes all elements in a stream

This terminal operation uses a Collector to perform a reduction on the elements of its input stream & returns the results of the reduction



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

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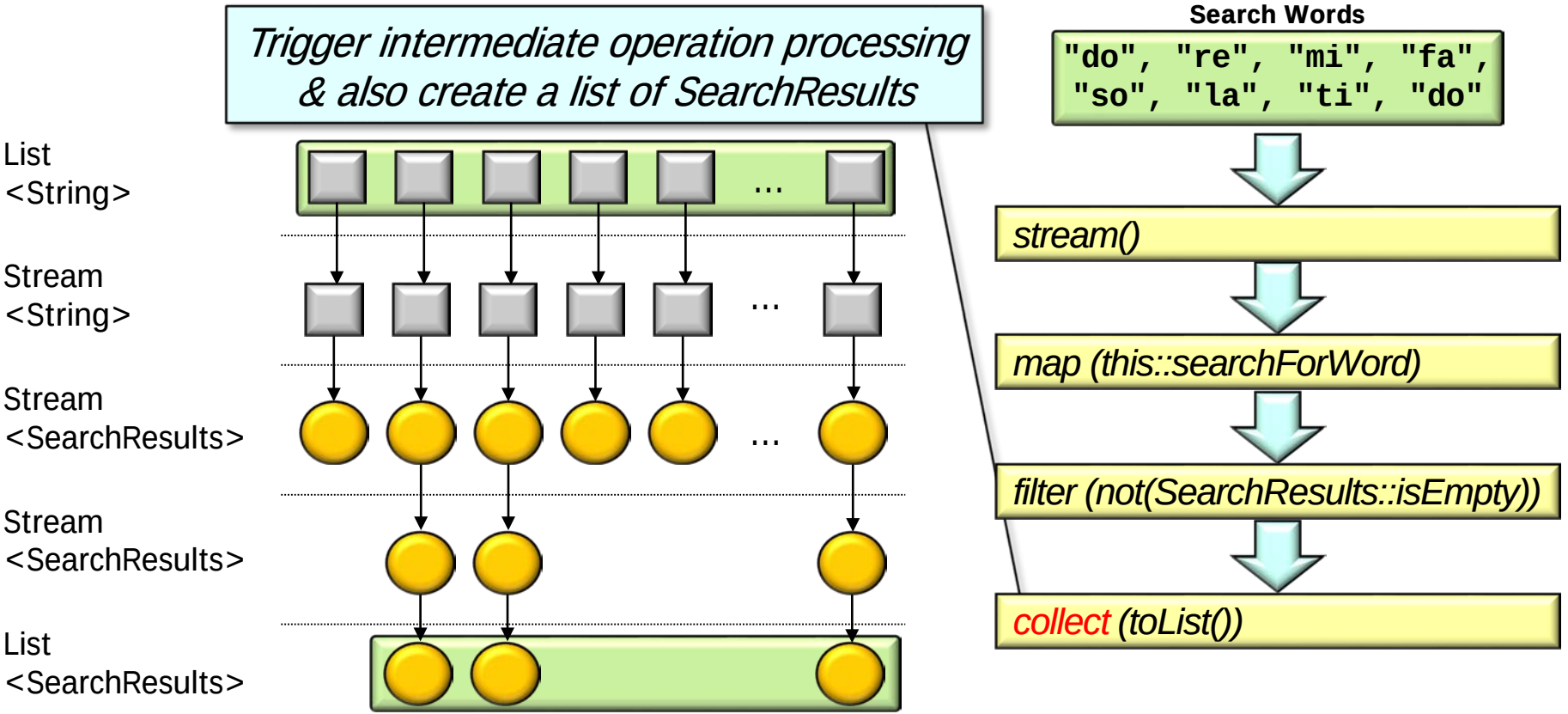

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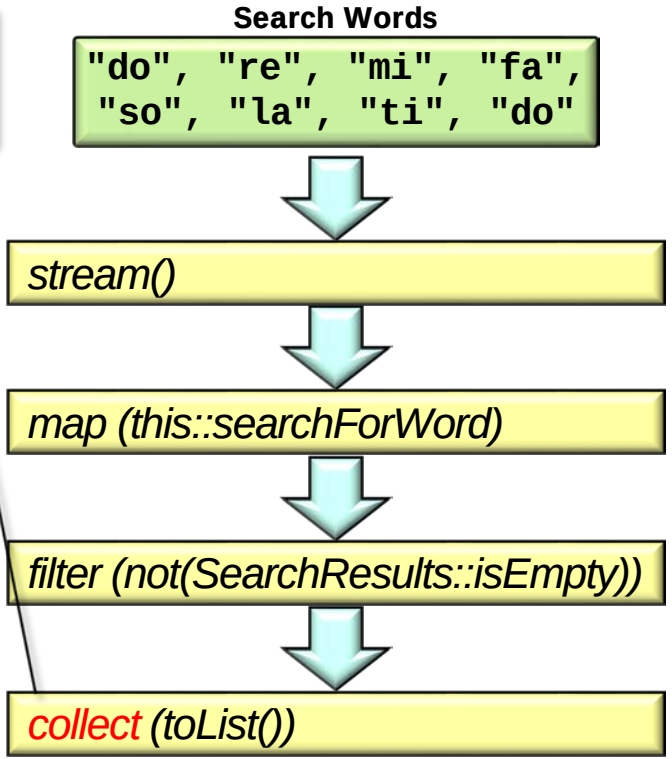

End of Overview of Java 8 Streams (Part 2)