Java Sequential SearchStreamGang Example: Introduction

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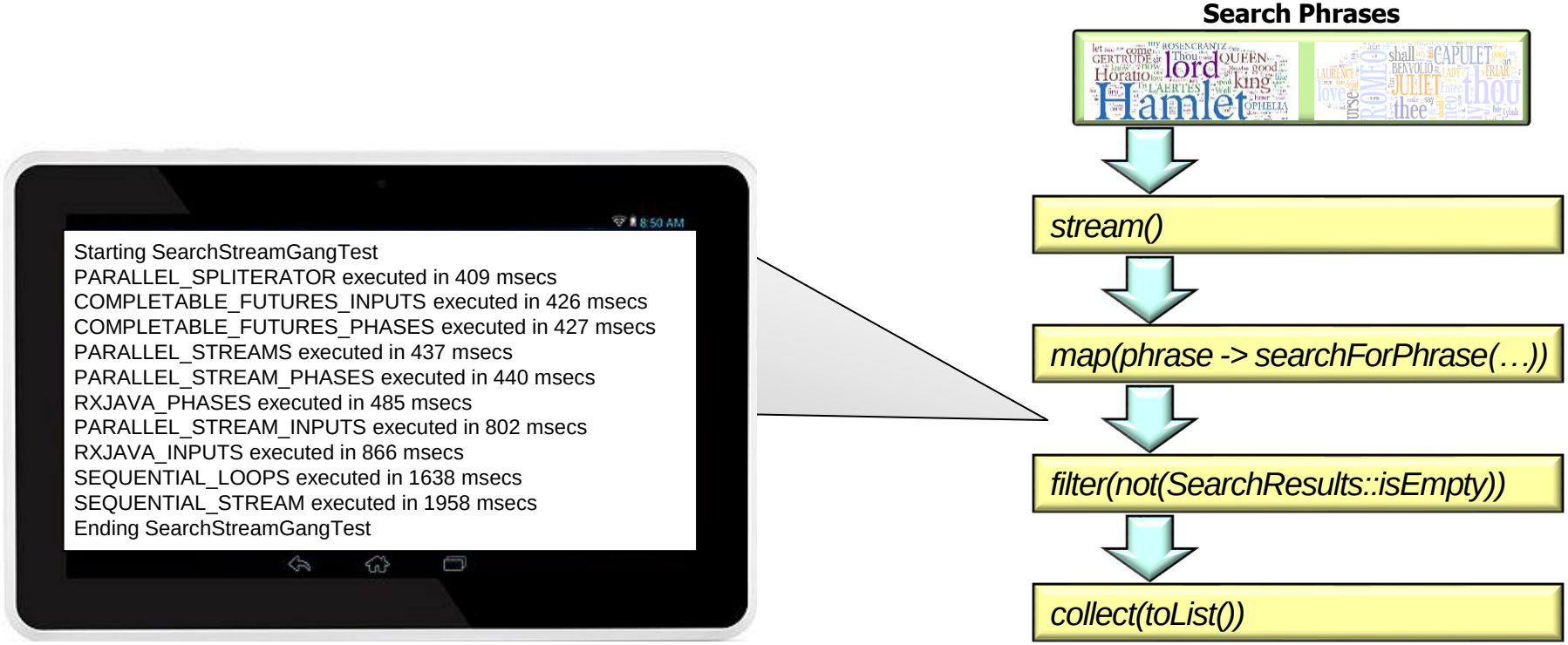
Learning Objectives in this Part of the Lesson

- Understand the design of the SearchStreamGang program



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

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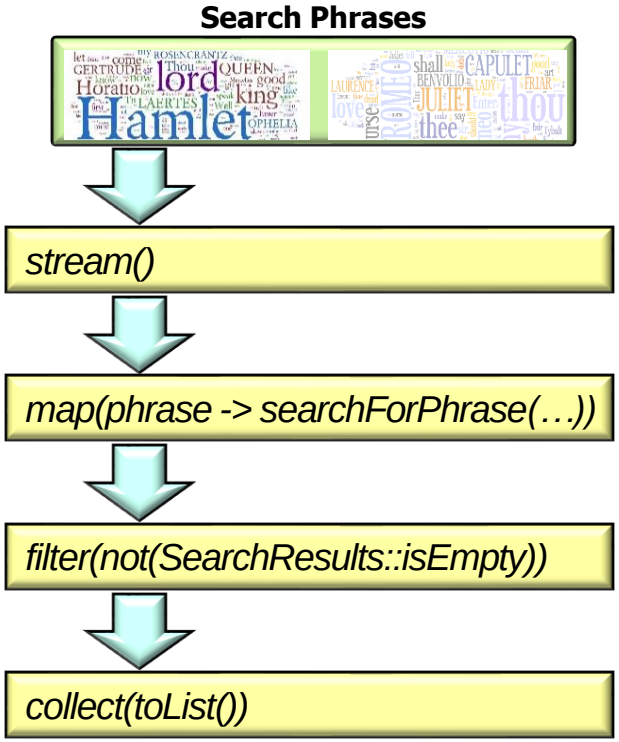

This example is more interesting than the SimpleSearchStream program

Overview of SearchStreamGang

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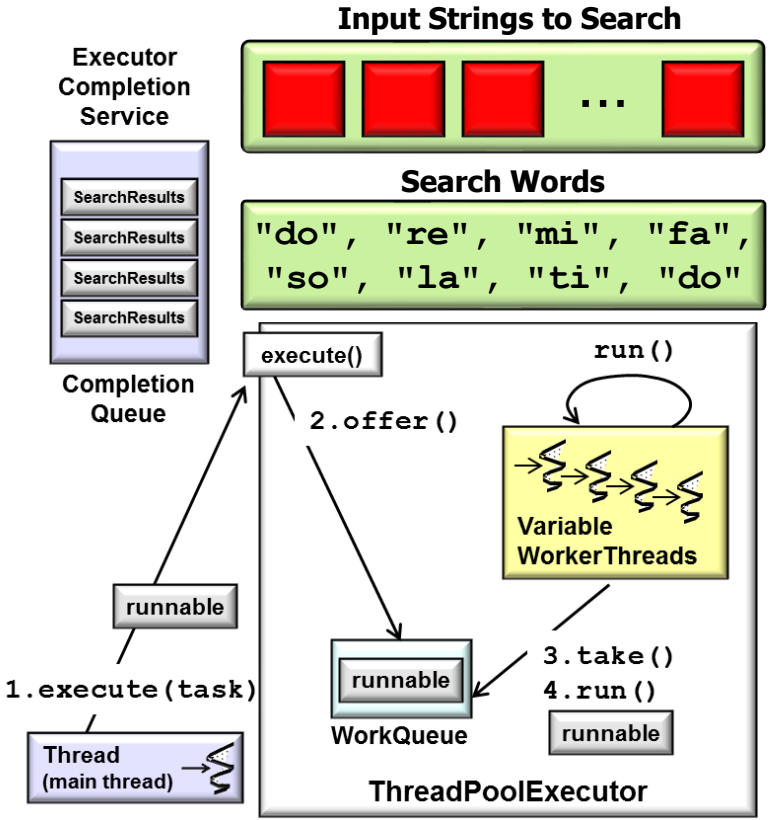
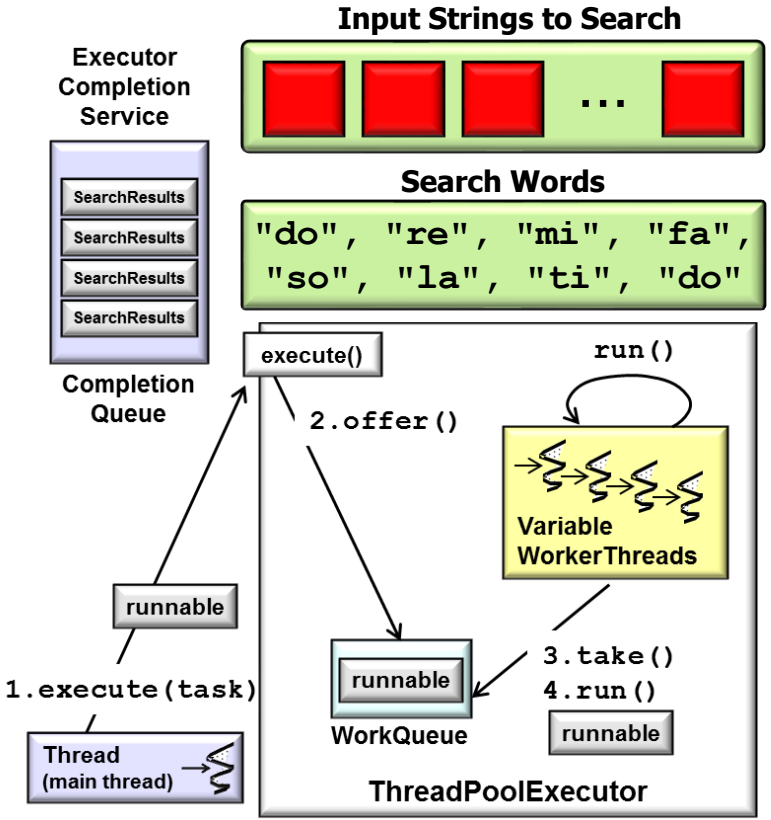
- SearchStreamGang revises SearchTaskGang to use functional programming & streams instead of OO prorgramming



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

Overview of SearchStreamGang

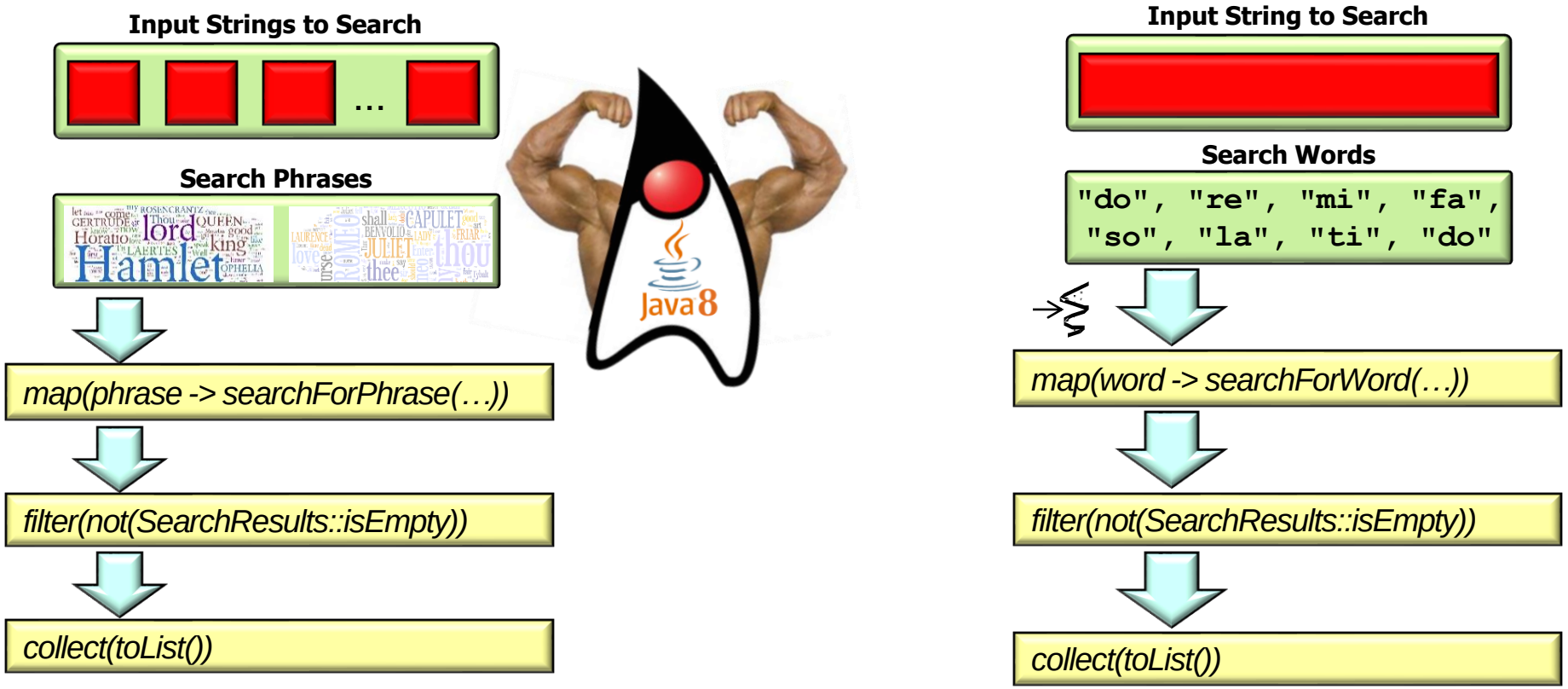
- SearchStreamGang revises SearchTaskGang to use functional programming & streams instead of OO prorgramming
  - SearchTaskGang showcases the Java executor framework for tasks that are "embarrassingly parallel"



e.g., Executor, ExecutorService, ExecutorCompletionService

Overview of SearchStreamGang

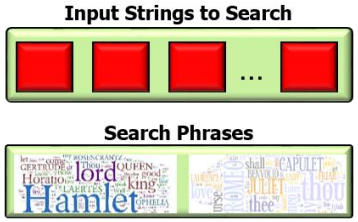
- SearchStreamGang is also a more powerful revision of SimpleSearchStream

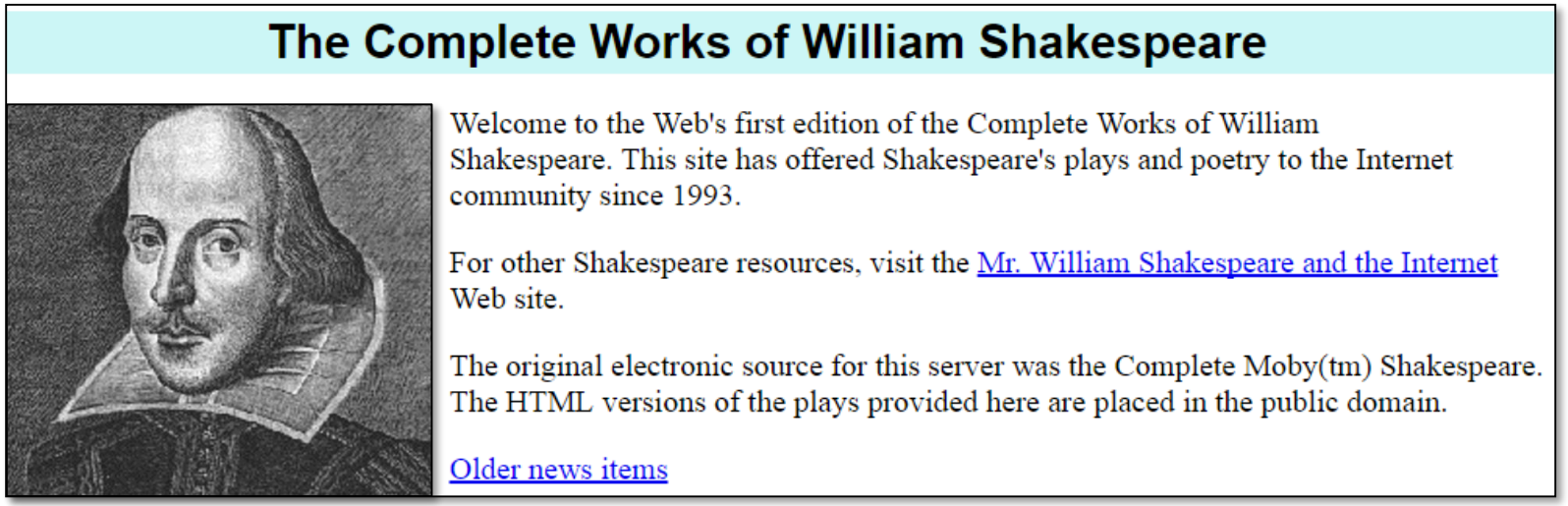


See github.com/douglascraigschmidt/LiveLessons/tree/master/SimpleSearchStream

Overview of SearchStreamGang

- SearchStreamGang is also a more powerful revision of SimpleSearchStream, e.g.
  - It uses regular expressions to find phrases in works of Shakespeare





See shakespeare.mit.edu

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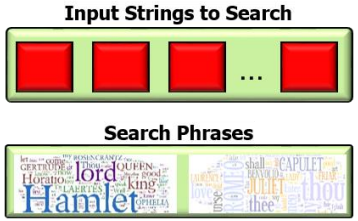

"…
My liege, and madam, to expostulate
What majesty should be, what duty is,
Why day is day, night is night, and time is time.
Were nothing but to waste night, day, and time.
Therefore, since brevity is the soul of wit,
And tediousness the limbs and outward flourishes,
I will be brief. …"

"Brevity is the soul of wit"

A phrase can match anywhere within a line

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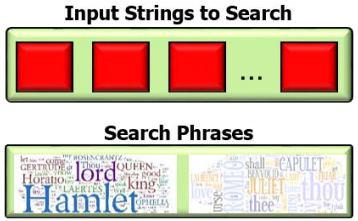


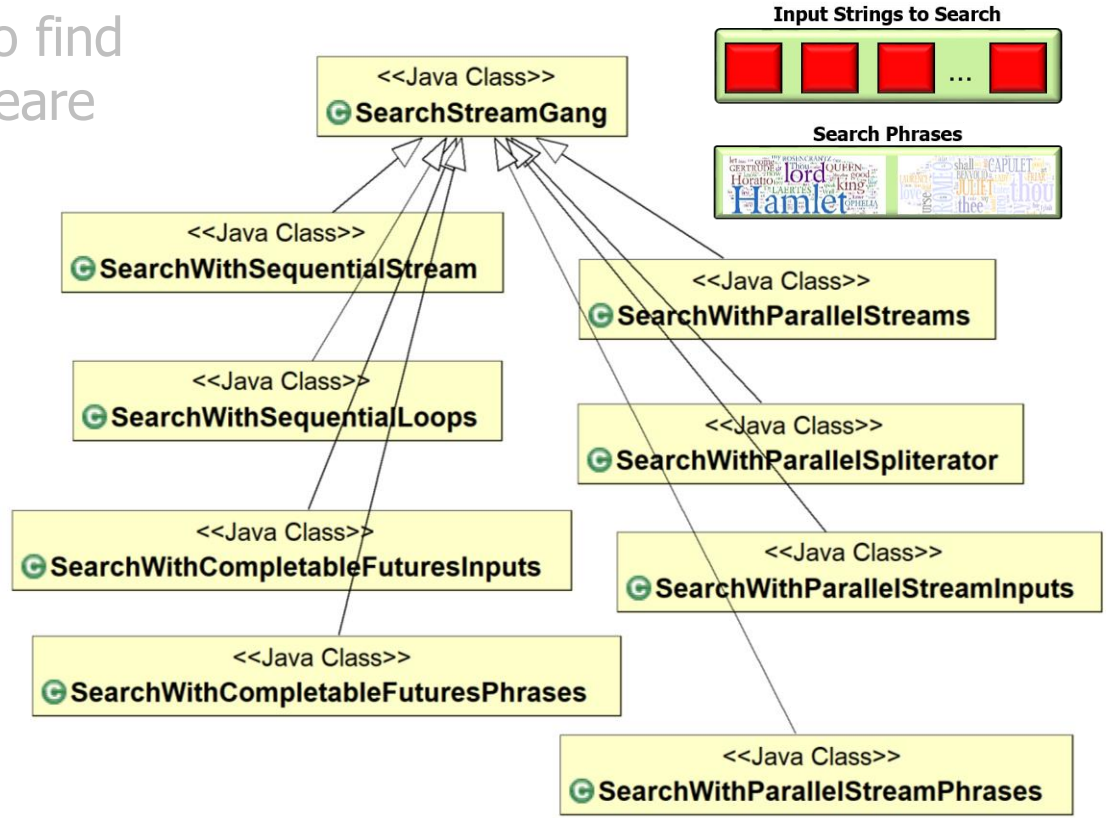
"…
What's in a name? That which we call a rose
By any other name would smell as sweet.
So Romeo would, were he not Romeo call'd,
Retain that dear perfection which he owes
Without that title. …"

"What's in a name? That which we call a rose
By any other name would smell as sweet."

The phrases can also match across multiple lines

Overview of SearchStreamGang

- SearchStreamGang is also a more powerful revision of SimpleSearchStream, e.g.
  - It uses regular expressions to find phrases in works of Shakespeare
  - It defines a framework for comparing Java concurrency & parallelism strategies



e.g., parallel streams, parallel spliterator, & completable futures

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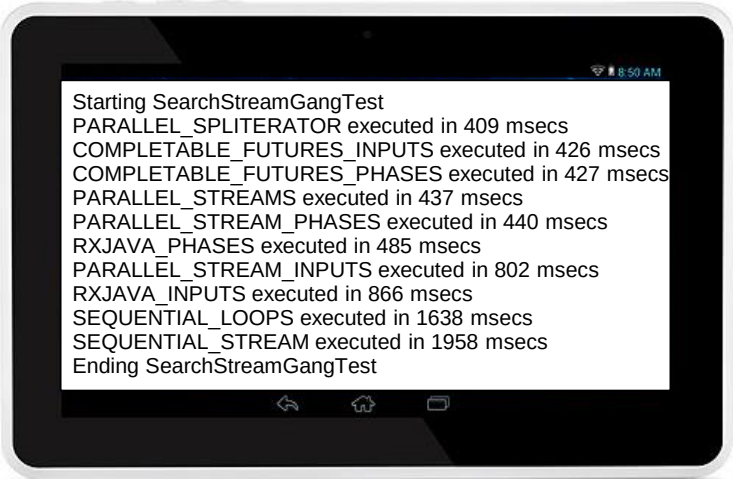

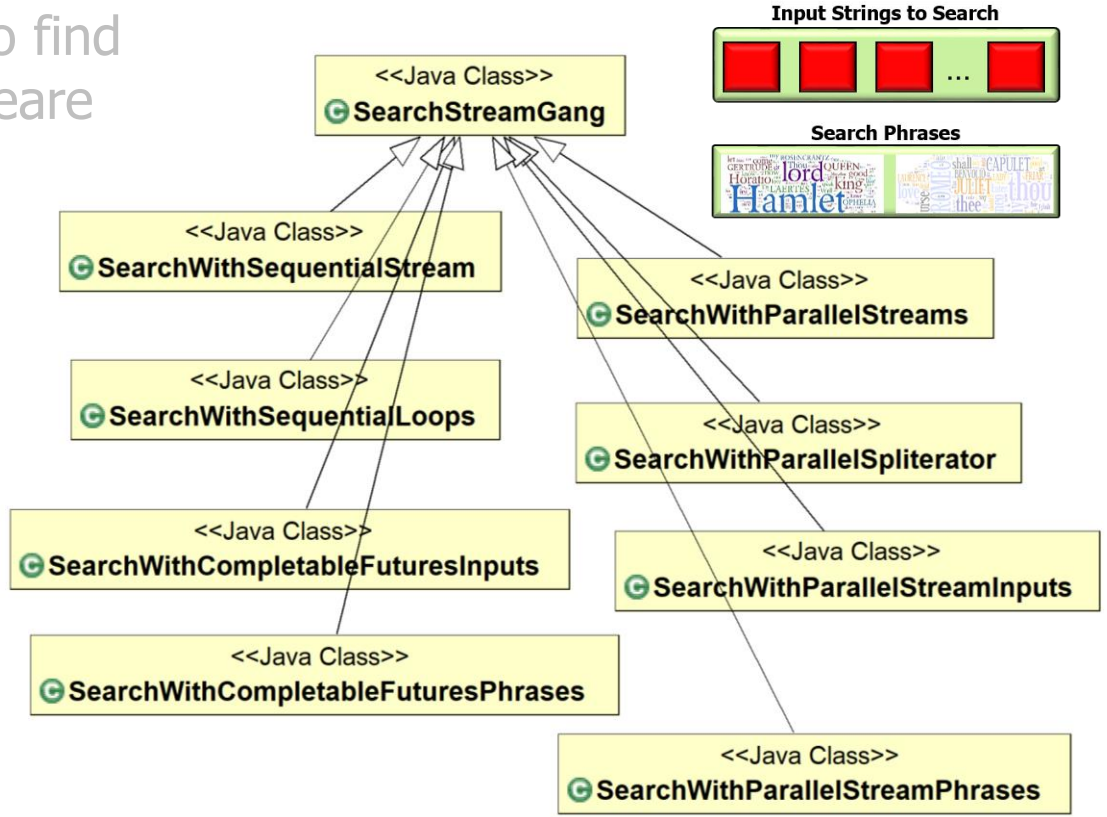

This framework enables "apples-to-apples" performance comparisons

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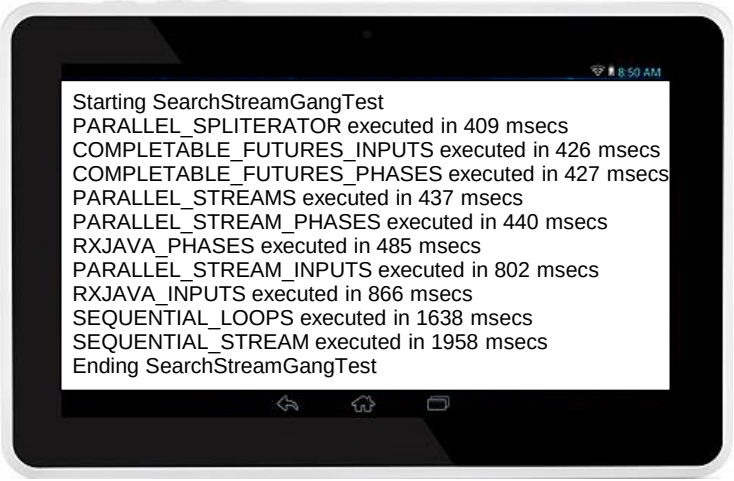

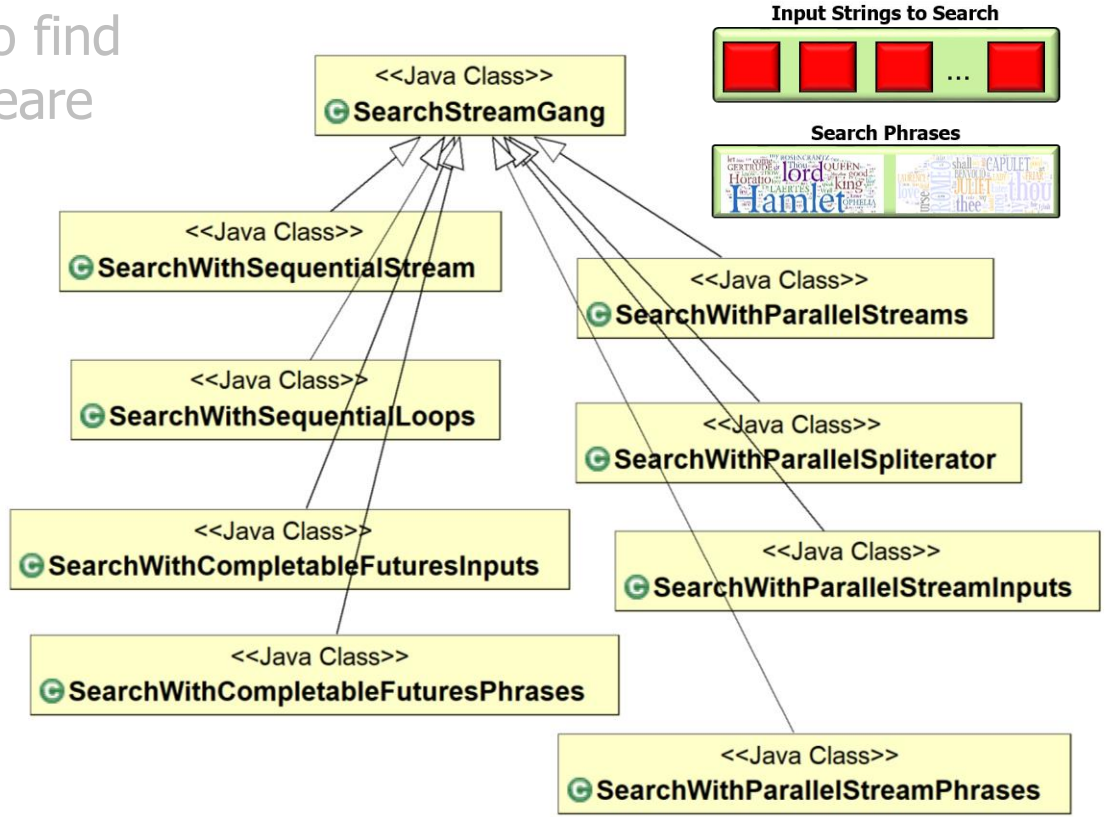

We'll cover Java concurrency/parallel strategies after covering sequential streams

Applying Sequential Streams to SearchStreamGang

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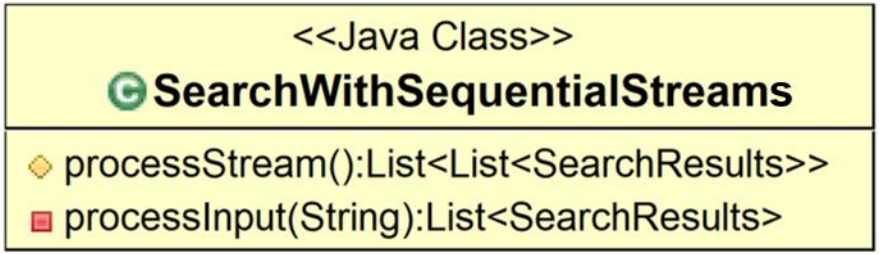
- We show aggregate operations in the SearchStreamGang's processStream() & processInput() methods



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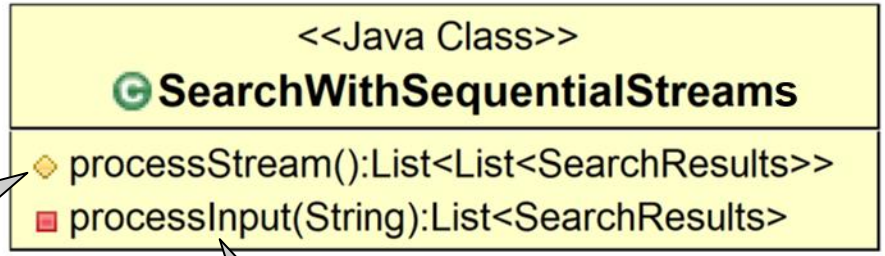


```
getInput()
   .stream()
   .map(this::processInput)
   .collect(toList());
```

```
return mPhrasesToFind
   .stream()
   .map(phrase -> searchForPhrase(phrase, input, title, false))
   .filter(not(SearchResults::isEmpty)
   .collect(toList());
```

See SearchStreamGang/src/main/java/livelessons/streamgangs/SearchWithSequentialStreams.java

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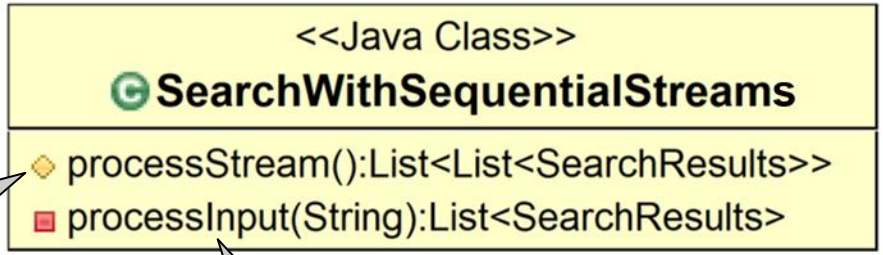


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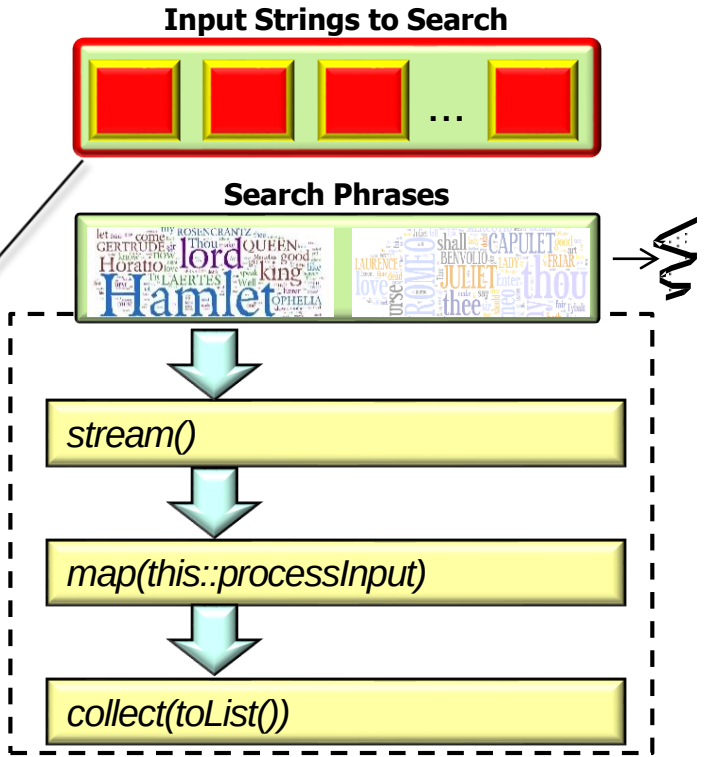
i.e., the map(), filter(), & collect() aggregate operations

Applying Sequential Streams to SearchStreamGang

- We show aggregate operations in the SearchStreamGang's processStream() & processInput() methods
  - **processStream()**
    - Uses a sequential stream to search a list of input strings in one thread

Each input string contains a work of Shakespeare (e.g., Hamlet, MacBeth, etc.)



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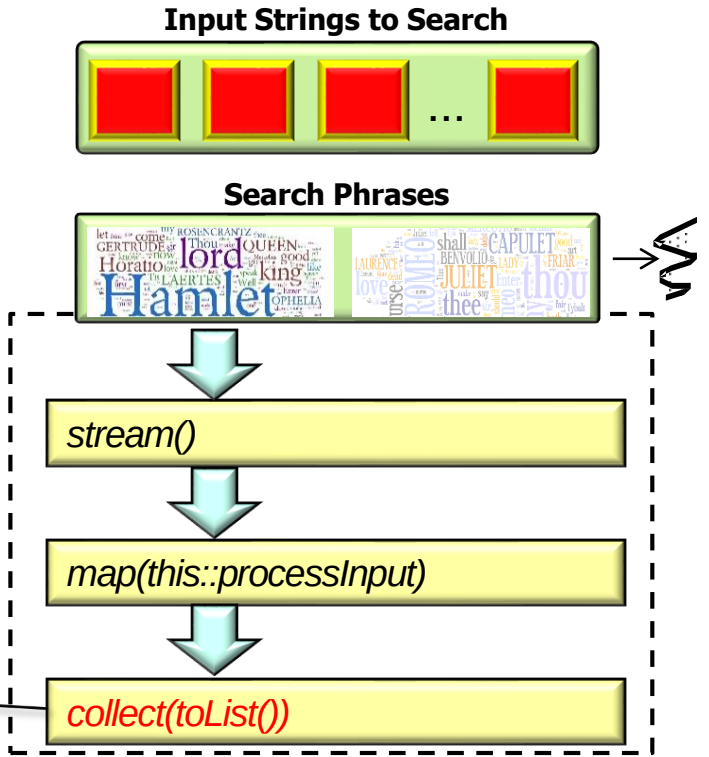

Returns a list of lists of SearchResults

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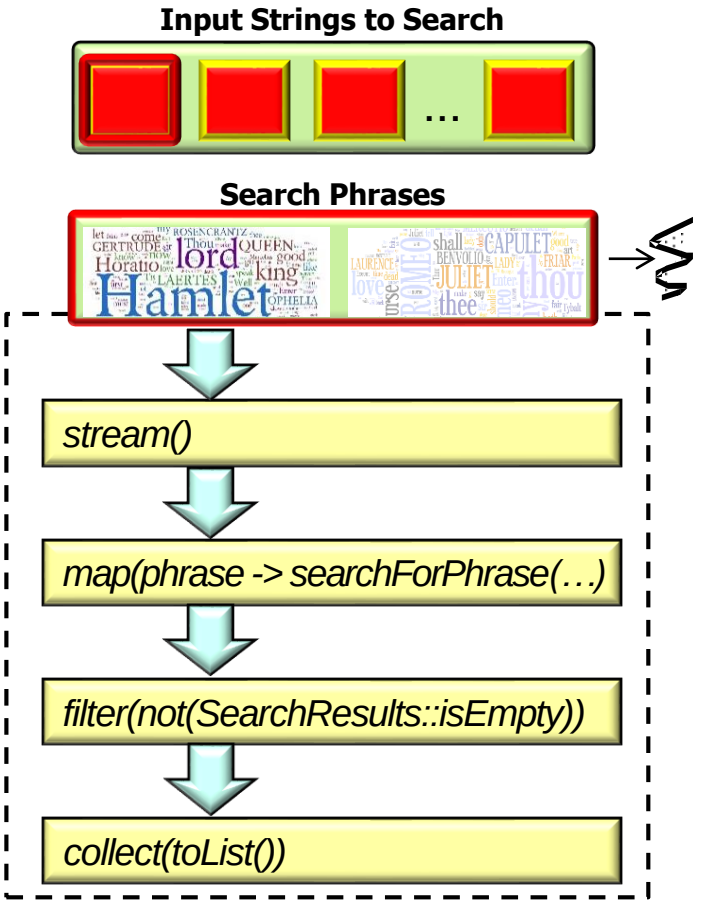
  - processStream()
  - **processInput()**
    - Uses a sequential stream to search a given input string & locate all the occurrences of phases in one thread



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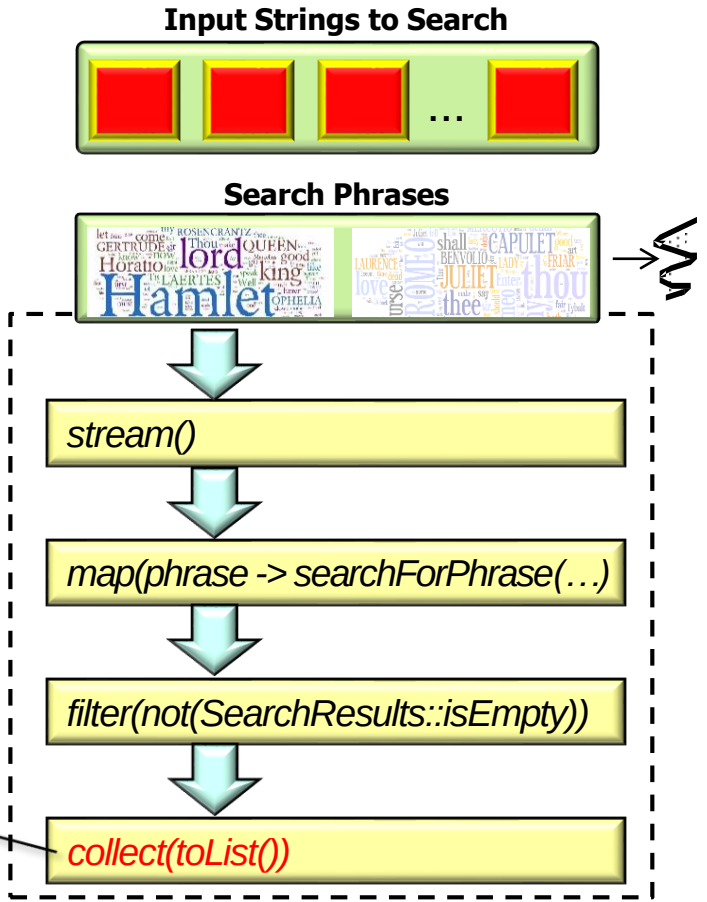

End of Java Sequential SearchStreamGang Example: Introduction