Java SearchWithParallelSpliterator Example: PhraseMatchSpliterator & Fields

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Learning Objectives in this Part of the Lesson

- Be aware of how a parallel spliterator can improve parallel stream performance
- Know the intent of—& fields in—the PhraseMatchSpliterator

```
class PhraseMatchSpliterator implements Spliterator<Result> {
  private CharSequence mInput;

  private final String mPhrase;

  private final Pattern mPattern;

  private Matcher mPhraseMatcher;

  private final int mMinSplitSize;

  private int mOffset = 0; ...
```

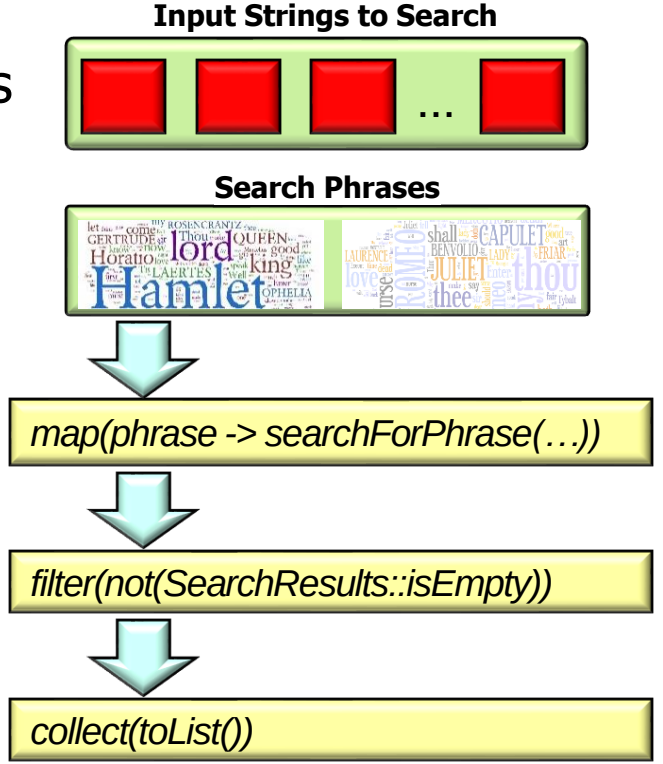
These fields are identical w/the SearchWithSequentialStreams class

See "*Java Sequential SearchStreamGang Example: Applying Spliterator*"

Overview of PhaseMatchSpliterator

Overview of PhraseMatchSpliterator

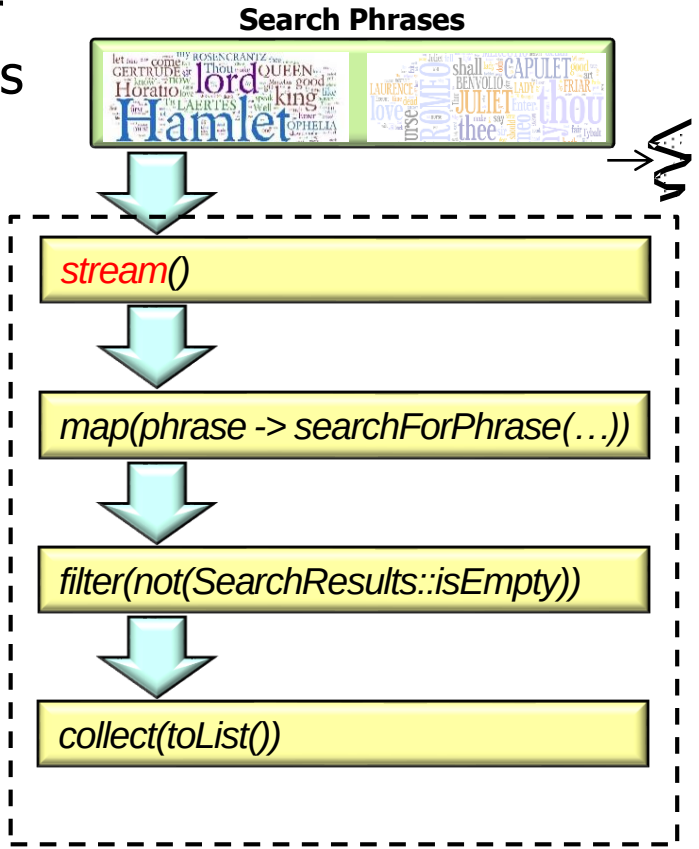
- SearchStreamGang uses PhraseMatchSpliterator that works for both sequential & parallel streams



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

Overview of PhraseMatchSpliterator

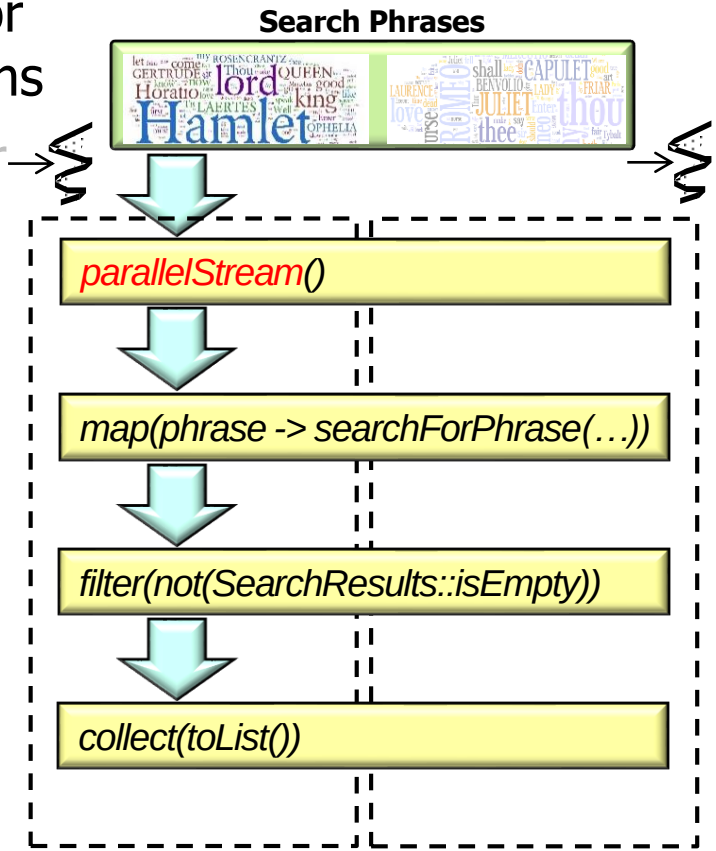
- SearchStreamGang uses PhraseMatchSpliterator that works for both sequential & parallel streams
  - We focused on the sequential portions earlier
    - & will review them again now briefly



See *"Java Sequential SearchStreamGang Example: Applying Spliterator"*

Overview of PhraseMatchSpliterator

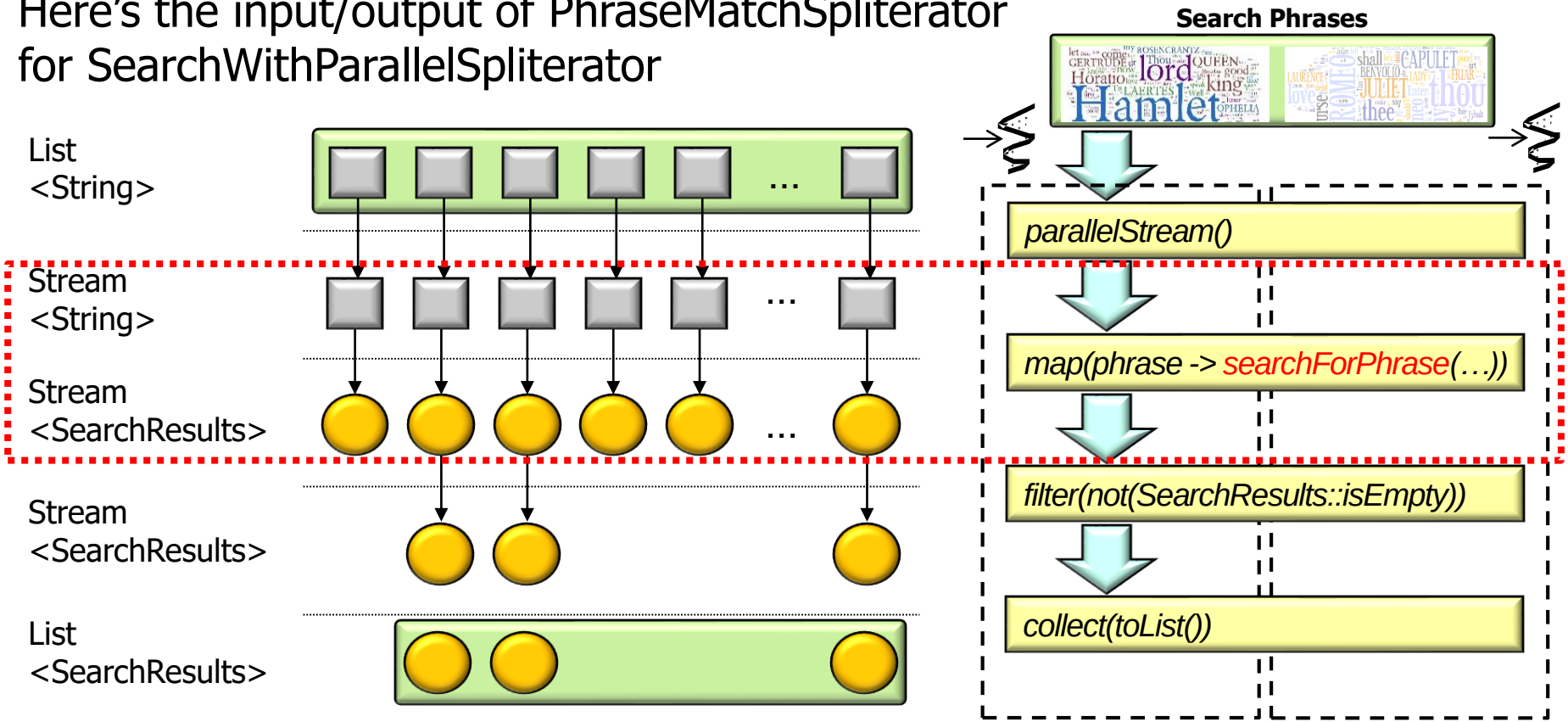
- SearchStreamGang uses PhraseMatchSpliterator that works for both sequential & parallel streams
  - We focused on the sequential portions earlier
  - We'll cover the parallel portions next



The goal is to further optimize the performance of the parallel streams solution

Overview of PhraseMatchSpliterator

- Here's the input/output of PhraseMatchSpliterator for SearchWithParallelSpliterator

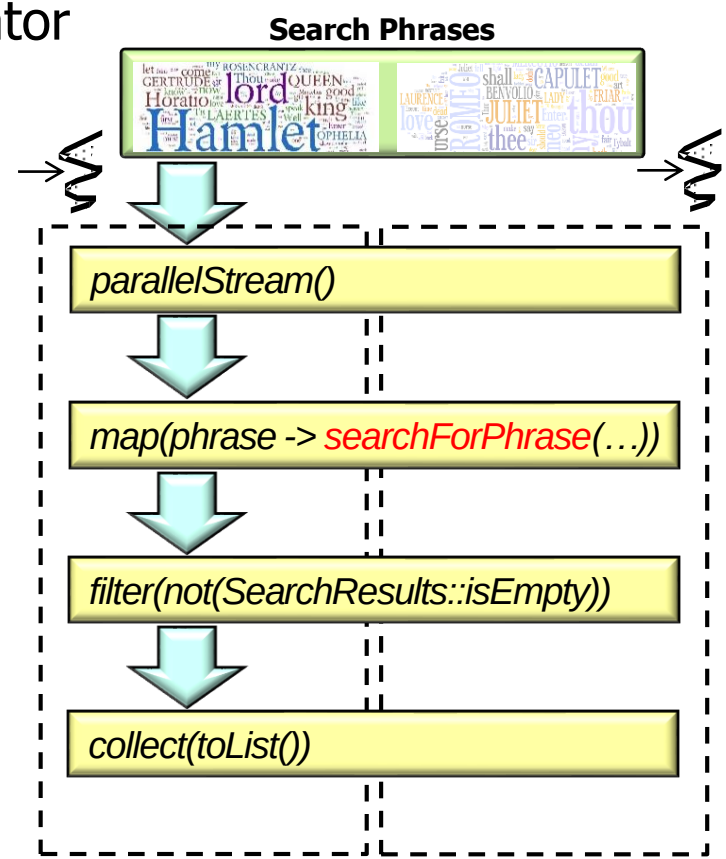


Overview of PhraseMatchSpliterator

- Here's the input/output of PhraseMatchSpliterator for SearchWithParallelSpliterator

"…
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. Your noble son is mad.
Mad call I it; for, to define true madness,
What is't but to be nothing else but mad?
But let that go…."

"Brevity is the soul of wit" at [54739]



This spliterator splits the input into multiple chunks & searches them in parallel

Overview of PhraseMatchSpliterator

- Here's the input/output of PhraseMatchSpliterator for SearchWithParallelSpliterator

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"Brevity is the soul of wit" at [54739]

"And tediousness the limbs and outward flourishes,
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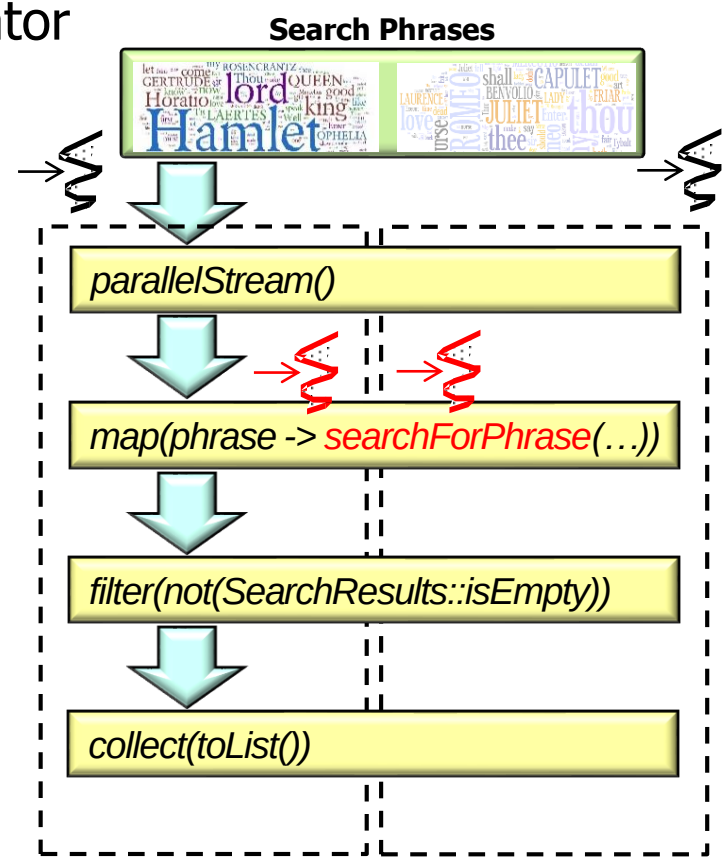


When the split occurs efficiently/evenly the speedups can be substantial!

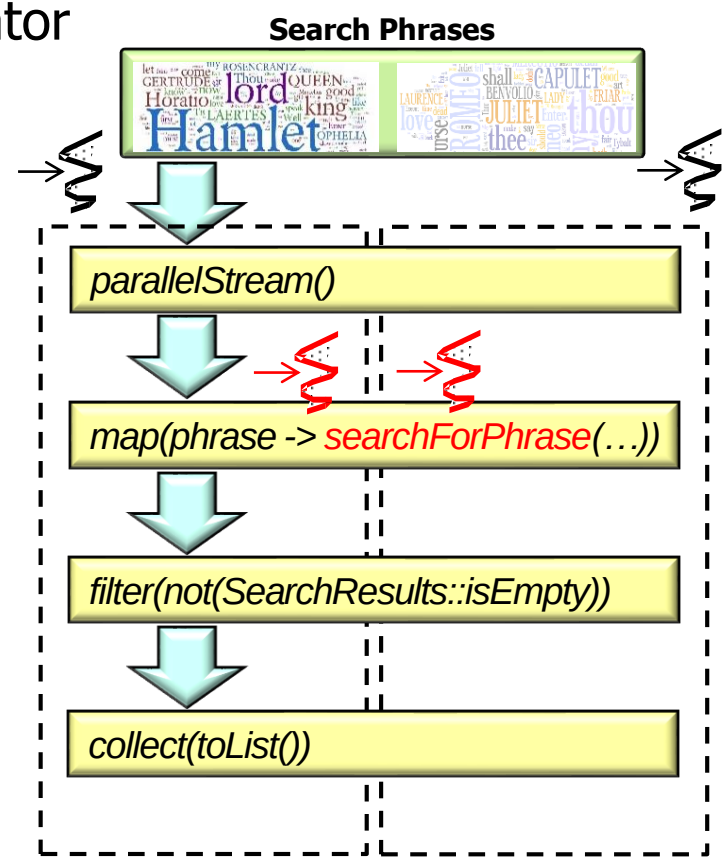
Overview of PhraseMatchSpliterator

- Here's the input/output of PhraseMatchSpliterator for SearchWithParallelSpliterator

"…
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"

"Brevity is the soul of wit" not found!

"wit, And tediousness the limbs and outward flourishes, I will be brief. Your noble son is mad.
Mad call I it; for, to define true madness,
What is't but to be nothing else but mad?
But let that go…."



However, the spliterator must be careful not to split input *across* phrases…

Analysis of PhaseMatch Spliterator Fields

Analysis of PhraseMatchSpliterator Fields

- PhraseMatchSpliterator uses Java regex to create a stream of SearchResults Result objects that match the # of times a phrase appears in an input string

```
class PhraseMatchSpliterator implements Spliterator<Result> {
  private CharSequence mInput;

  private final String mPhrase;

  private final Pattern mPattern;

  private final Matcher mPhraseMatcher;

  private final int mMinSplitSize;

  private int mOffset = 0;
  ...
```

Spliterator is an interface that defines eight methods, including tryAdvance() & trySplit()

See SearchStreamGang/src/main/java/livelessons/utils/PhraseMatchSpliterator.java

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```

These fields implement PhraseMatchSpliterator for both sequential & parallel use-cases

Some fields are updated in the trySplit() method, which is why they aren't final

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```

Contains a single work of Shakespeare

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```

Contains the phrase to search for in the work

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  ...
```

Contains the regular expression representation of the phrase

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

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Contains a matcher that searches for the phrase in the input

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

Analysis of PhraseMatchSpliterator Fields

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```

Dictates the minimum size to perform a split

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```

The offset needed to return the appropriate index into the original input string

This value is reset by each spliterator to account for different chunks

End of Java SearchWith ParallelSpliterator Example: PhraseMatchSpliterator & Fields