Learn How to Implement Java SearchWith ParallelStreams Hook Methods

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Learning Objectives in this Part of the Lesson

- Know how Java parallel streams are applied in SearchWithParallelStreams

Implementing `processStream()` as a Parallel Stream
Implementing processStream() as a Parallel Stream

- Parallel processStream() has one minuscule change wrt the sequential version

```java
protected List<List<SearchResults>> processStream() {
    List<CharSequence> inputList =
    getInput();

    return inputList
    .parallelStream()
    .map(this::processInput)
    .collect(toList());
}
```
Implementing `processStream()` as a Parallel Stream

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}
```

Uses the ArrayList spliterator to create a parallel stream that searches an arraylist of input strings in multiple worker threads.

See [docs.oracle.com/javase/8/docs/api/java/util/Spliterator.html](docs.oracle.com/javase/8/docs/api/java/util/Spliterator.html)
Implementing `processStream()` as a Parallel Stream

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        .parallelStream()
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}
```

Each input string is processed in parallel using the common fork-join pool.
Implementing `processStream()` as a Parallel Stream

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}
```

`Searches a given input string to locate all occurrences of phrases`
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    return inputList
        .parallelStream()
        .map(this::processInput)
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}
```

Collectors.toList() returns a non-concurrent collector that obeys encounter order

**Trigger intermediate operation processing & merge partial results into a single list of lists**
Implementing `processInput()` as a Parallel Stream
Implementing `processInput()` as a Parallel Stream

- Likewise, this `processInput()` implementation has just one minuscule change:

```java
List<SearchResults> processInput(CharSequence inputSeq) {
    String title = getTitle(inputSeq);
    CharSequence input = inputSeq.subSequence(...);

    List<SearchResults> results = mPhrasesToFind.parallelStream()
        .map(phrase ->
            searchForPhrase(phrase, input, title, false))
        .filter(not(SearchResults::isEmpty))
        .collect(toList());

    return results;
}
```
Implementing `processInput()` as a Parallel Stream

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```java
List<SearchResults> processInput(CharSequence inputSeq) {
    String title = getTitle(inputSeq);
    CharSequence input = inputSeq.subSequence(...);

    List<SearchResults> results = mPhrasesToFind
        .parallelStream()
        .map(phrase ->
            searchForPhrase(phrase, input, title,
            .filter(not(SearchResults::isEmpty))
        .collect(toList()));
    return results;
}
```

Uses `ArrayList` spliterator to create a parallel stream that searches an input string to locate all phrase occurrences.

See [docs.oracle.com/javase/8/docs/api/java/util/Spliterator.html](docs.oracle.com/javase/8/docs/api/java/util/Spliterator.html)
Implementing `processInput()` as a Parallel Stream

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        .filter(not(SearchResults::isEmpty))
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    return results;
}
```

The `PhraseMatchSpliterator` breaks the input into “chunks” that are processed sequentially.
Implementing `processInput()` as a Parallel Stream

- Likewise, this `processInput()` implementation has just one minuscule change

```java
List<SearchResults> processInput(CharSequence inputSeq) {
    String title = getTitle(inputSeq);
    CharSequence input = inputSeq;

    List<SearchResults> results =
        .parallelStream()
        .map(phrase ->
            searchForPhrase(phrase
                .filter(not(SearchResults::)
                .collect(toList()));
        return results;
    }
```

Each phrase (& each input string) is processed in parallel in the common fork-join pool
Likewise, this `processInput()` implementation has just one minuscule change:

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List<SearchResults> processInput(CharSequence inputSeq) {
    String title = getTitle(inputSeq);
    CharSequence input = inputSeq.

    List<SearchResults> results =
        .parallelStream()
        .map(phrase ->
            searchForPhrase(phrase, input, title, false)
                .filter(not(SearchResults::isEmpty))
        )
        .collect(toList());
    return results;
}
```

Collectors.toList() returns a non-concurrent collector that obeys encounter order.
Implementing `processInput()` as a Parallel Stream

- Likewise, this `processInput()` implementation has just one minuscule change.

```java
List<SearchResults> processInput(CharSequence inputSeq) {
    String title = getTitle(inputSeq);
    CharSequence input = inputSeq;

    List<SearchResults> results =
        .parallelStream()
        .map(phrase ->
            searchForPhrase(phrase, input, title, false))
        .filter(not(SearchResults::isEmpty))
        .collect(toList());
    return results;
}
```

*Return the list of search results*
End of Learn How to Implement Java Search With ParallelStreams Hook Methods