Visualizing the Java SearchWith ParallelStreams Hook Methods

Douglas C. Schmidt

d.schmidt@vanderbilt.edu

www.dre.vanderbilt.edu/~schmidt

Professor of Computer Science

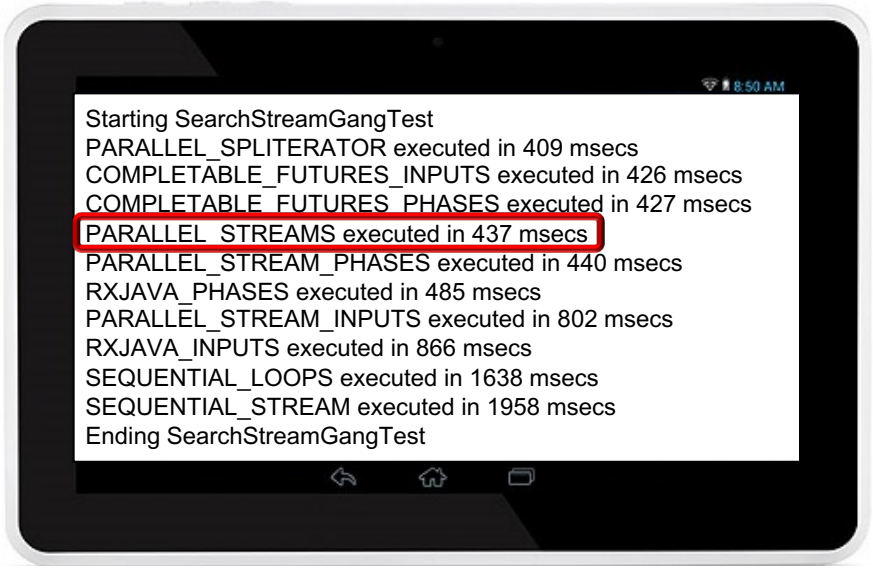
Institute for Software Integrated Systems

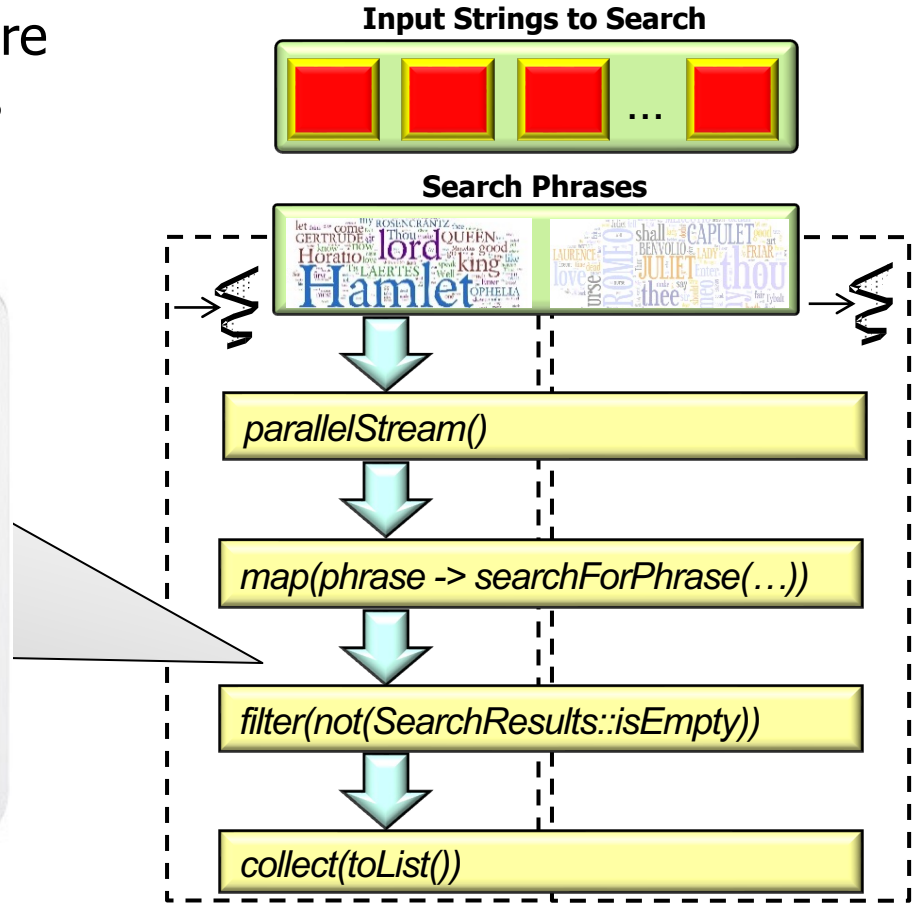
Vanderbilt University

Nashville, Tennessee, USA

Learning Objectives in this Part of the Lesson

- Visualize how Java parallel streams are applied in SearchWithParallelStreams



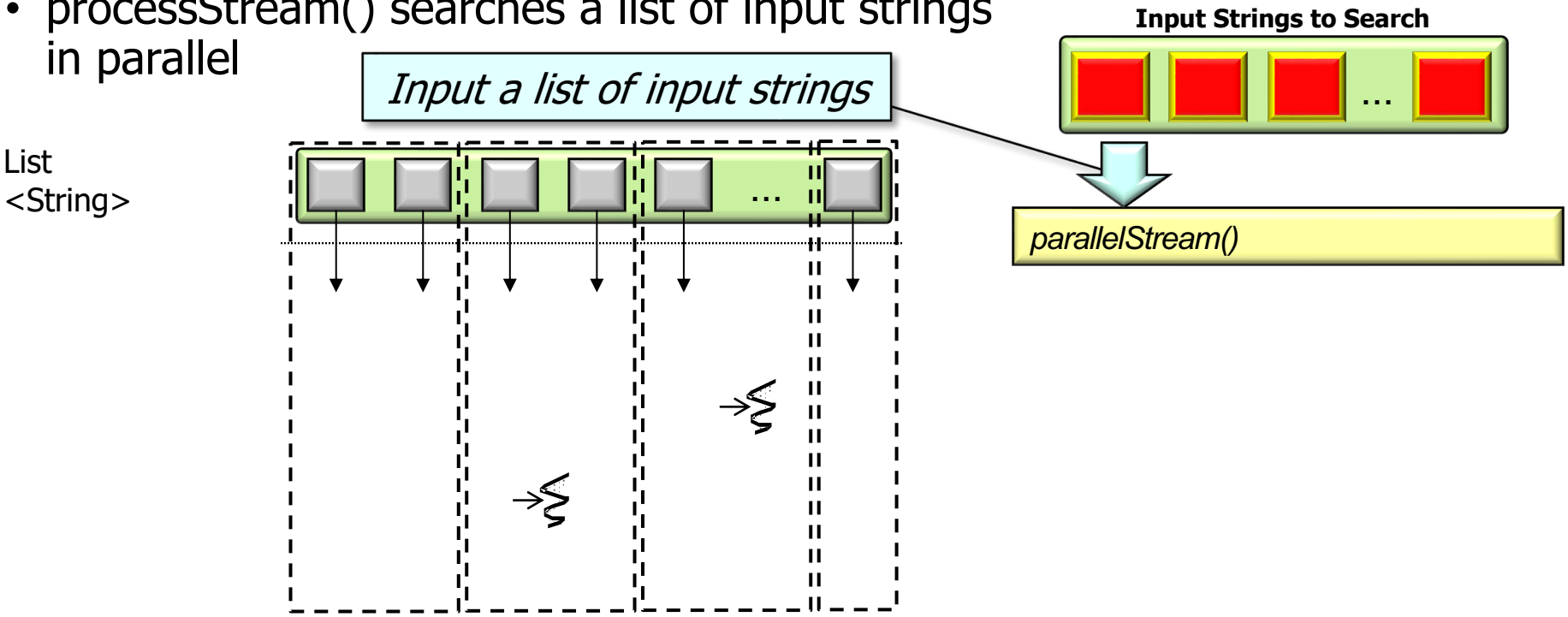


See github.com/douglascraigschmidt/LiveLessons/tree/master/SearchStreamGang

Visualizing the processStream() Method

Visualizing the processStream() Method

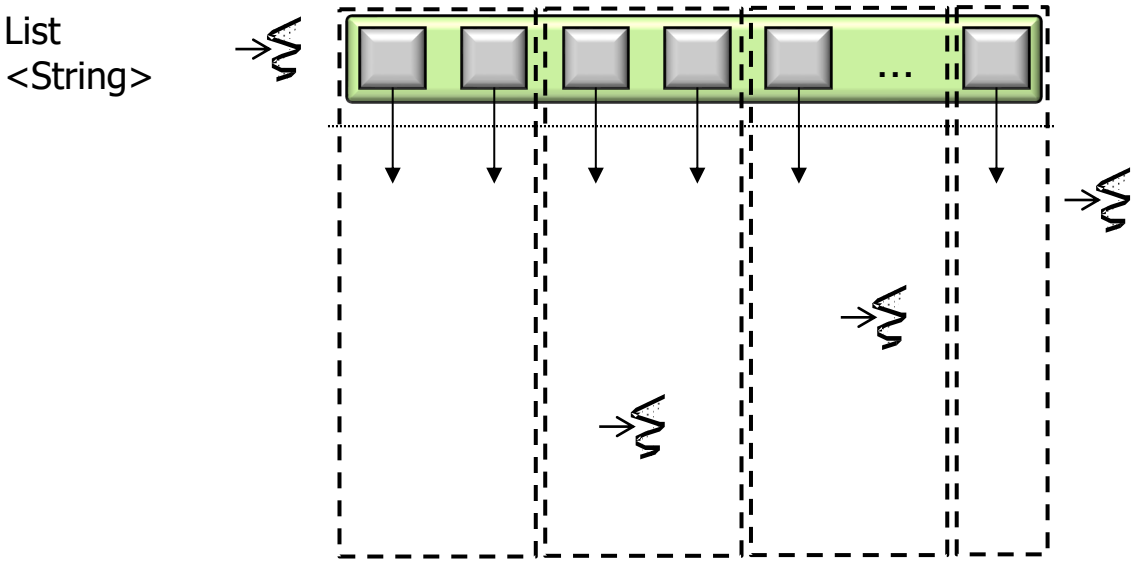
- processStream() searches a list of input strings in parallel

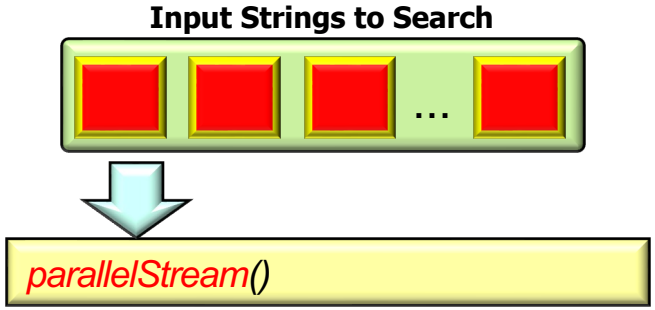


Each input string contains a work of Shakespeare (e.g., Hamlet, MacBeth, etc.)

Visualizing the processStream() Method

- processStream() searches a list of input strings in parallel

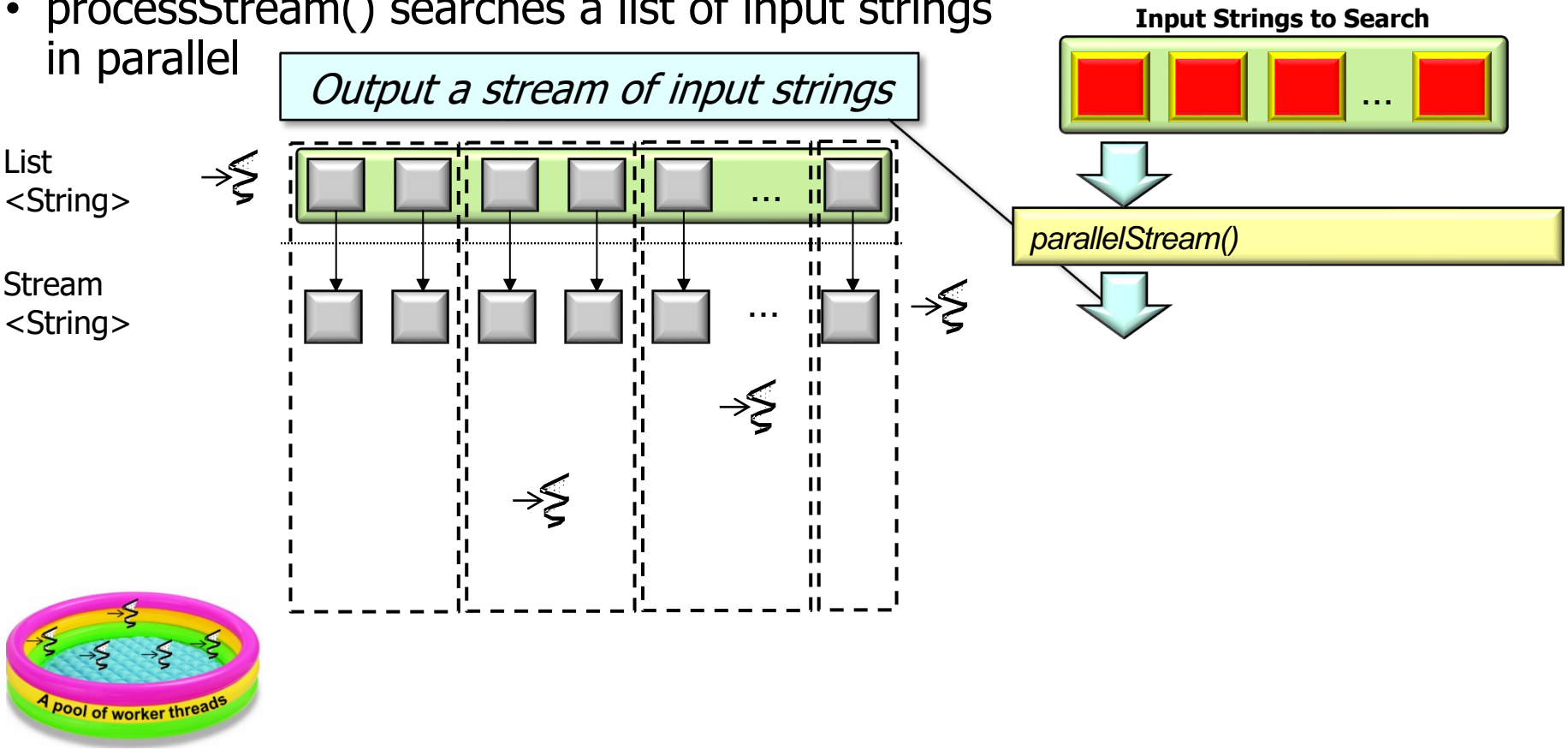




Convert a collection to a parallel stream, i.e., split into chunks of input strings

Visualizing the processStream() Method

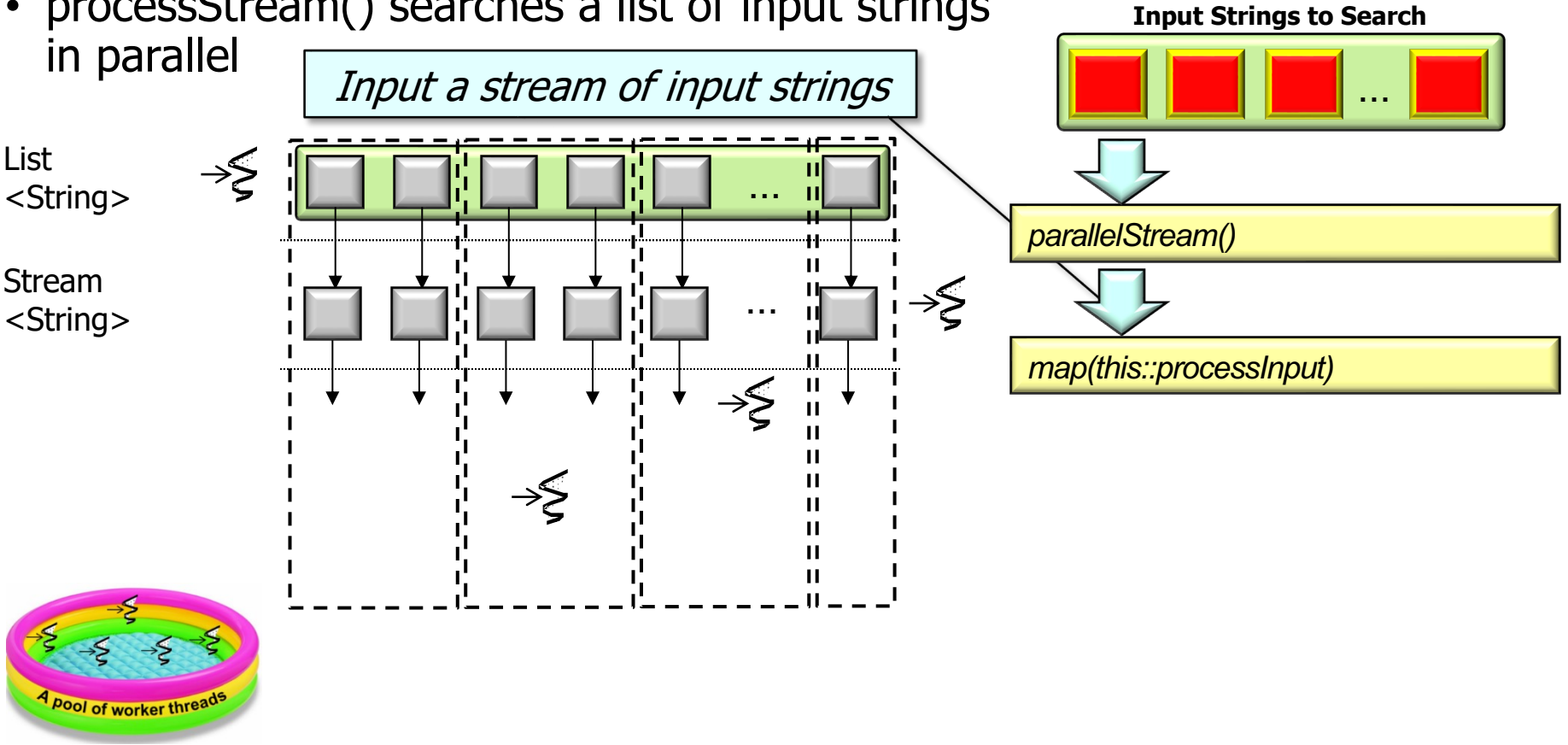
- processStream() searches a list of input strings in parallel



Chunks of input strings are processed in parallel on separate threads/cores

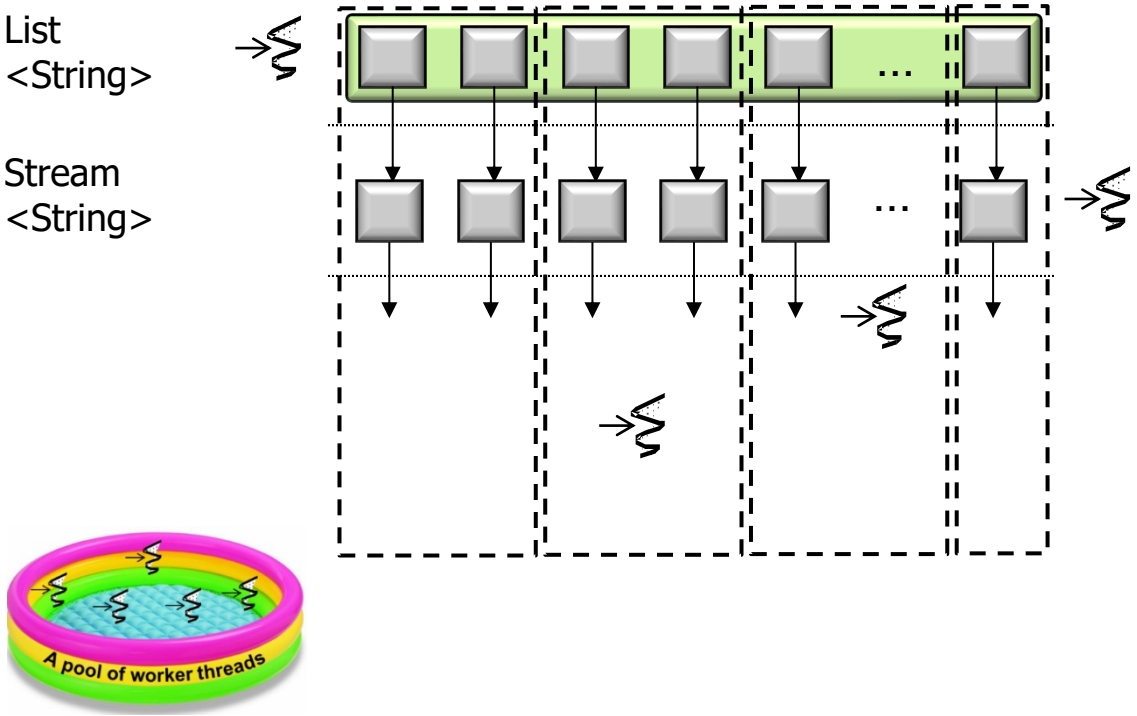
Visualizing the processStream() Method

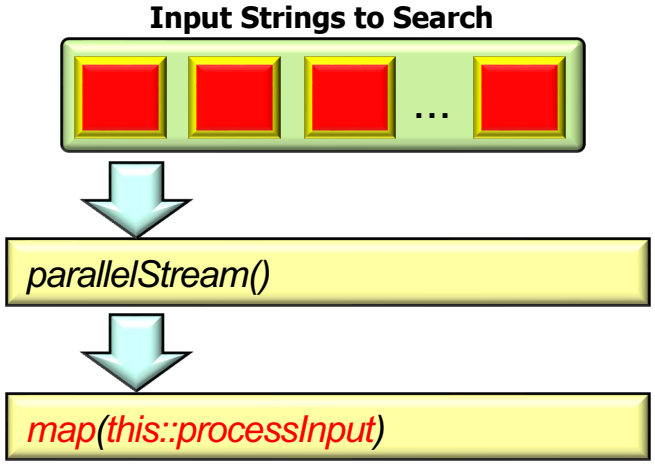
- processStream() searches a list of input strings in parallel



Visualizing the processStream() Method

- processStream() searches a list of input strings in parallel

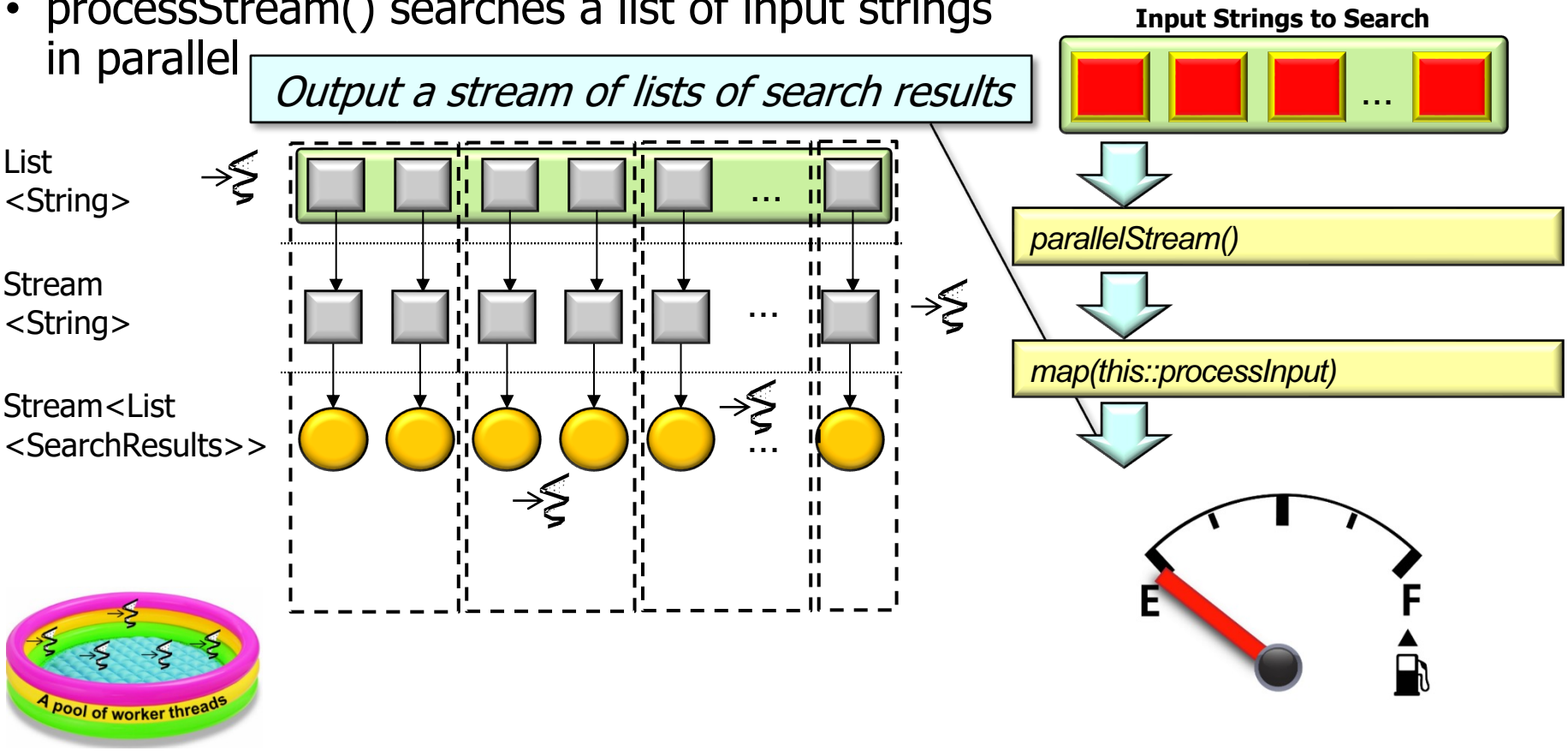




Call processInput() to search for phrases in a given input string in parallel

Visualizing the processStream() Method

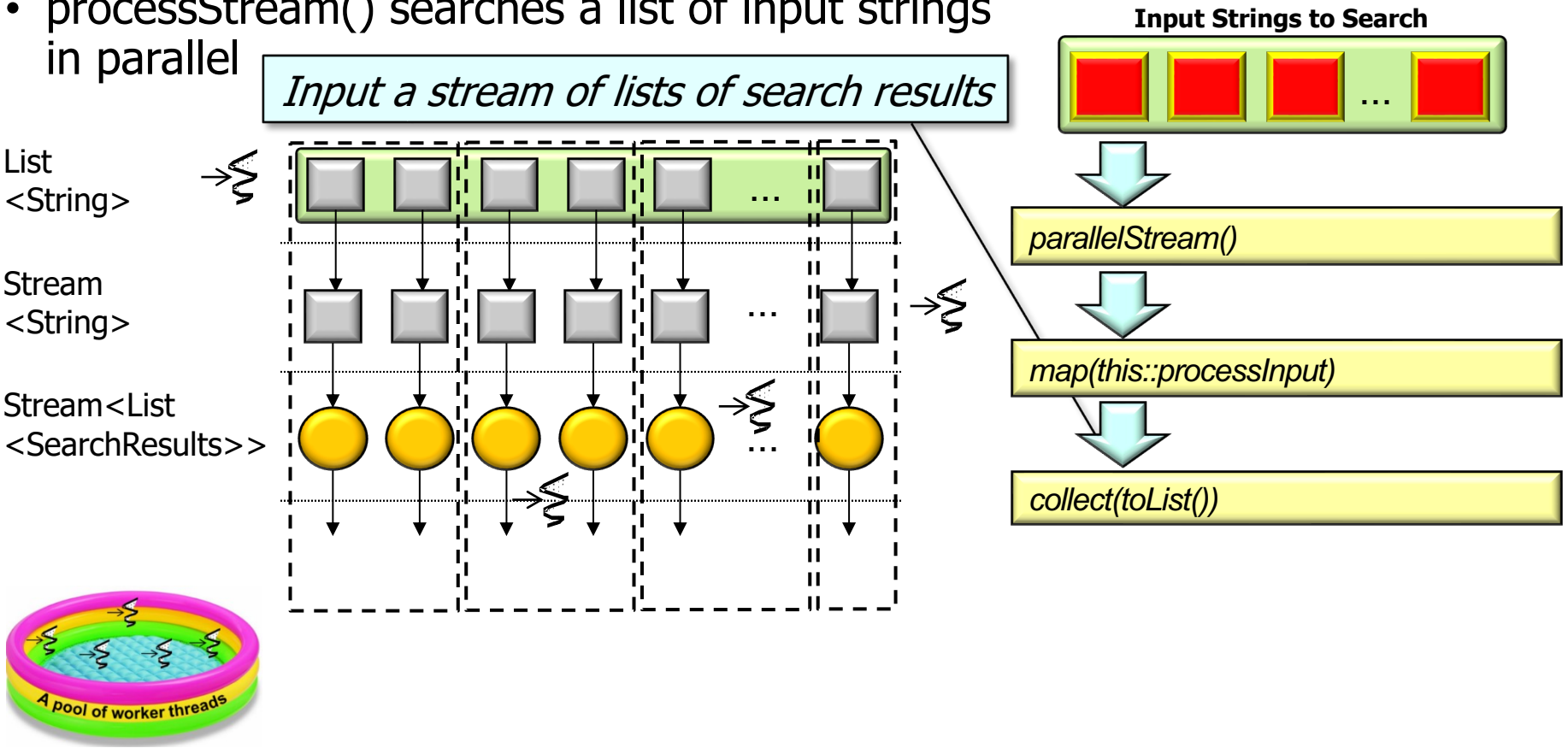
- processStream() searches a list of input strings in parallel



Some lists of search results may be empty if no phrases matched an input string

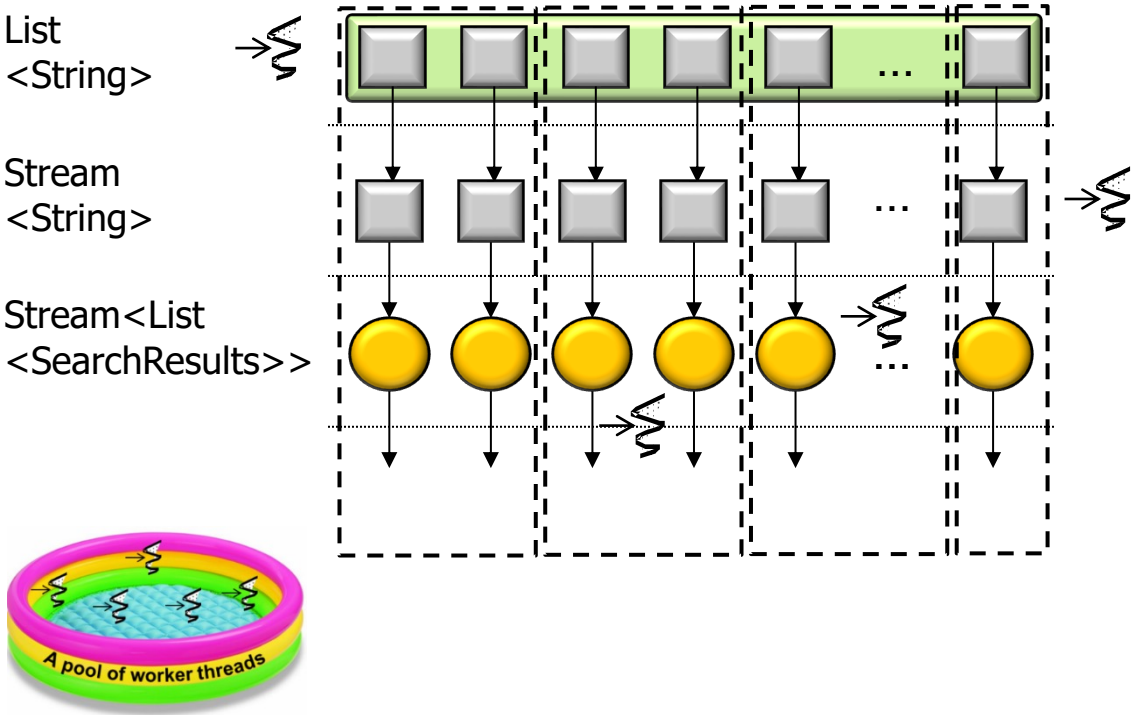
Visualizing the processStream() Method

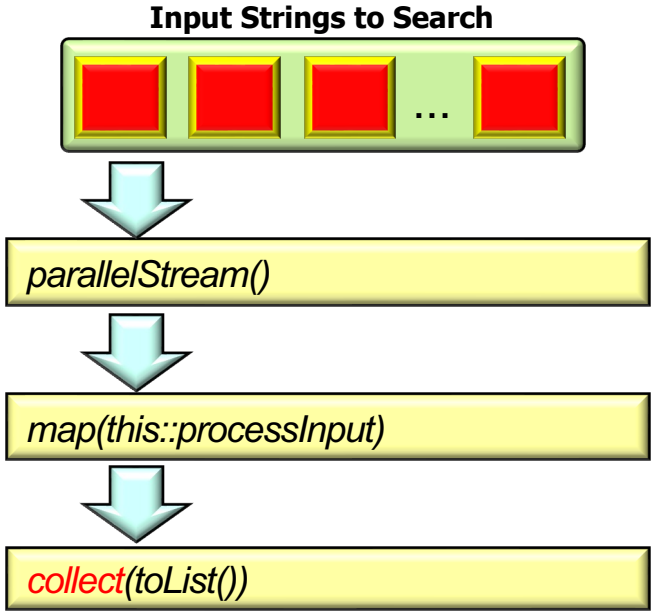
- processStream() searches a list of input strings in parallel



Visualizing the processStream() Method

- processStream() searches a list of input strings in parallel

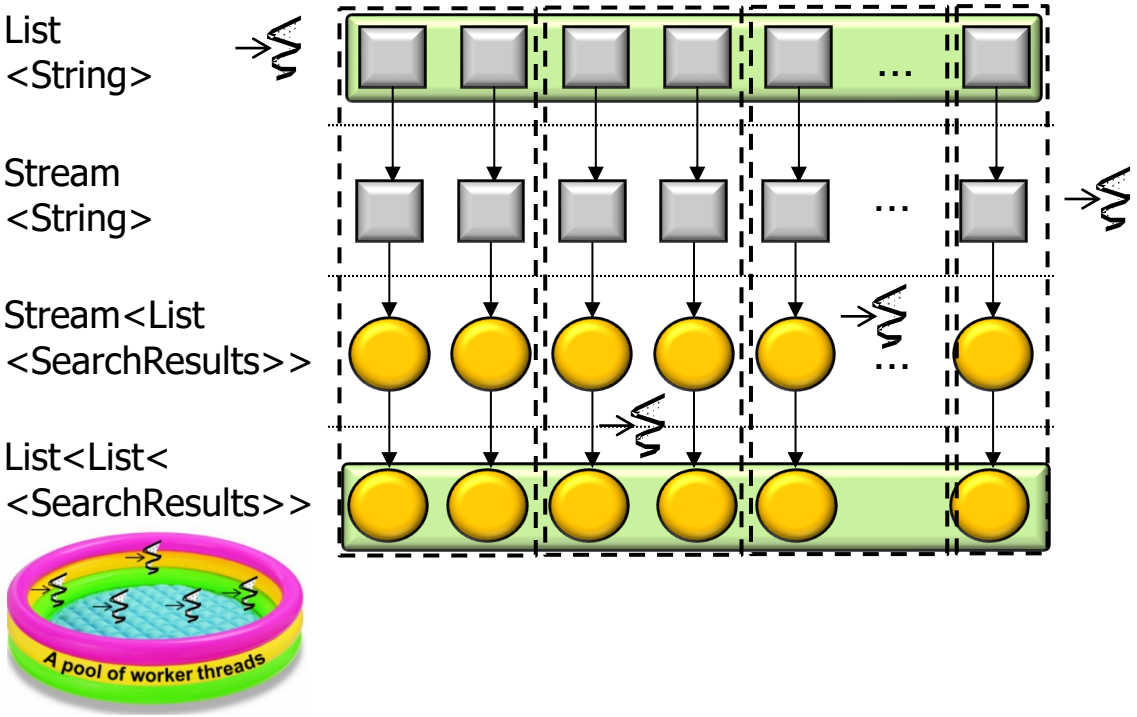


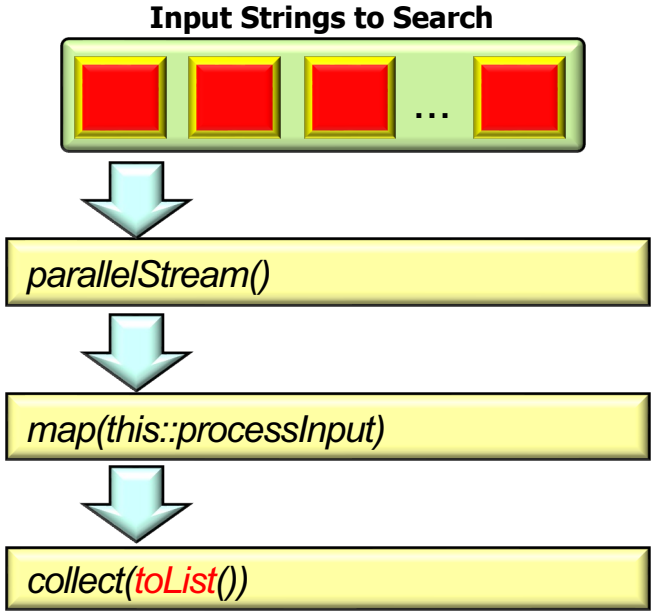


Trigger intermediate operation processing to run on multiple worker threads & cores

Visualizing the processStream() Method

- processStream() searches a list of input strings in parallel



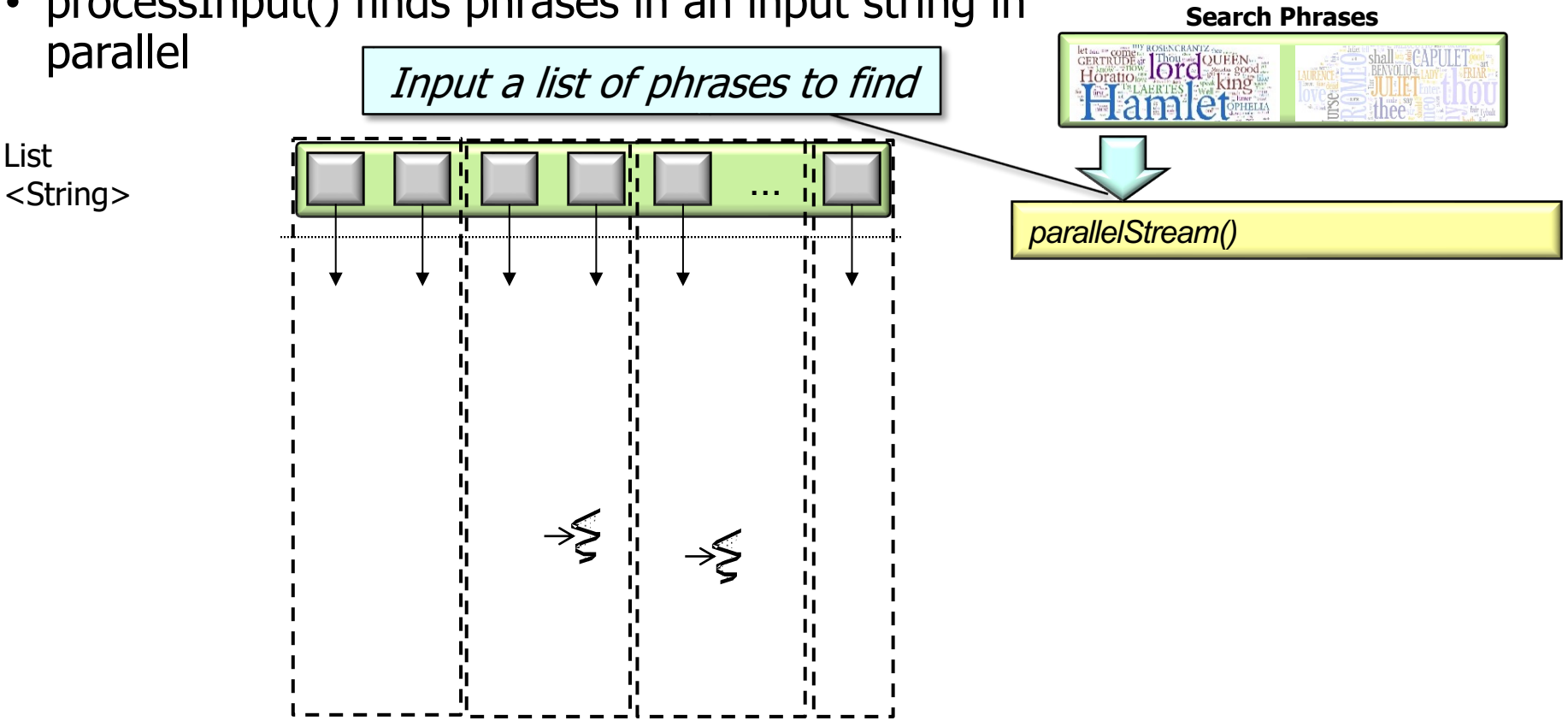


Return a list of lists of search results based on "encounter order"

Visualizing the processInput() Method

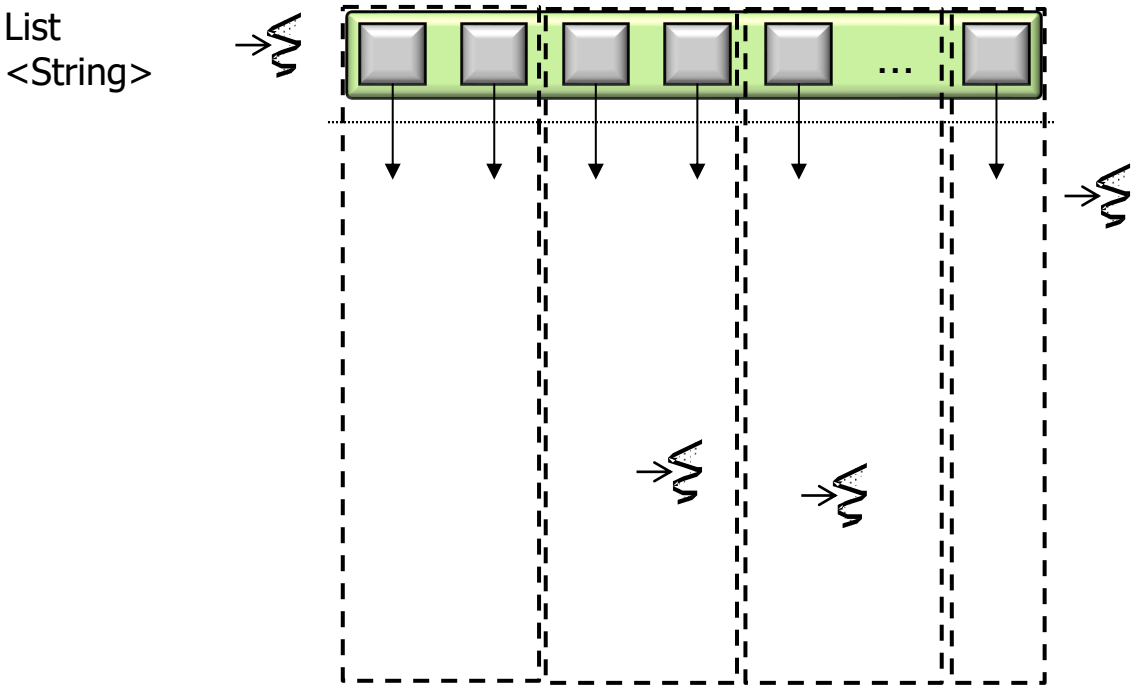
Visualizing the processInput() Method

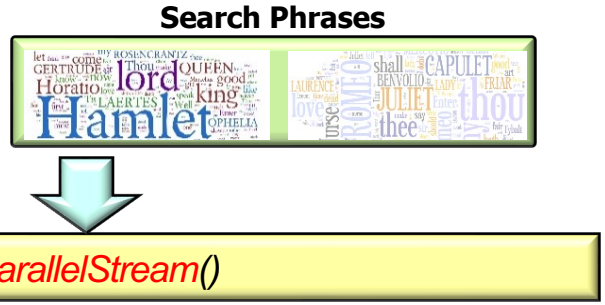
- processInput() finds phrases in an input string in parallel



Visualizing the processInput() Method

- processInput() finds phrases in an input string in parallel

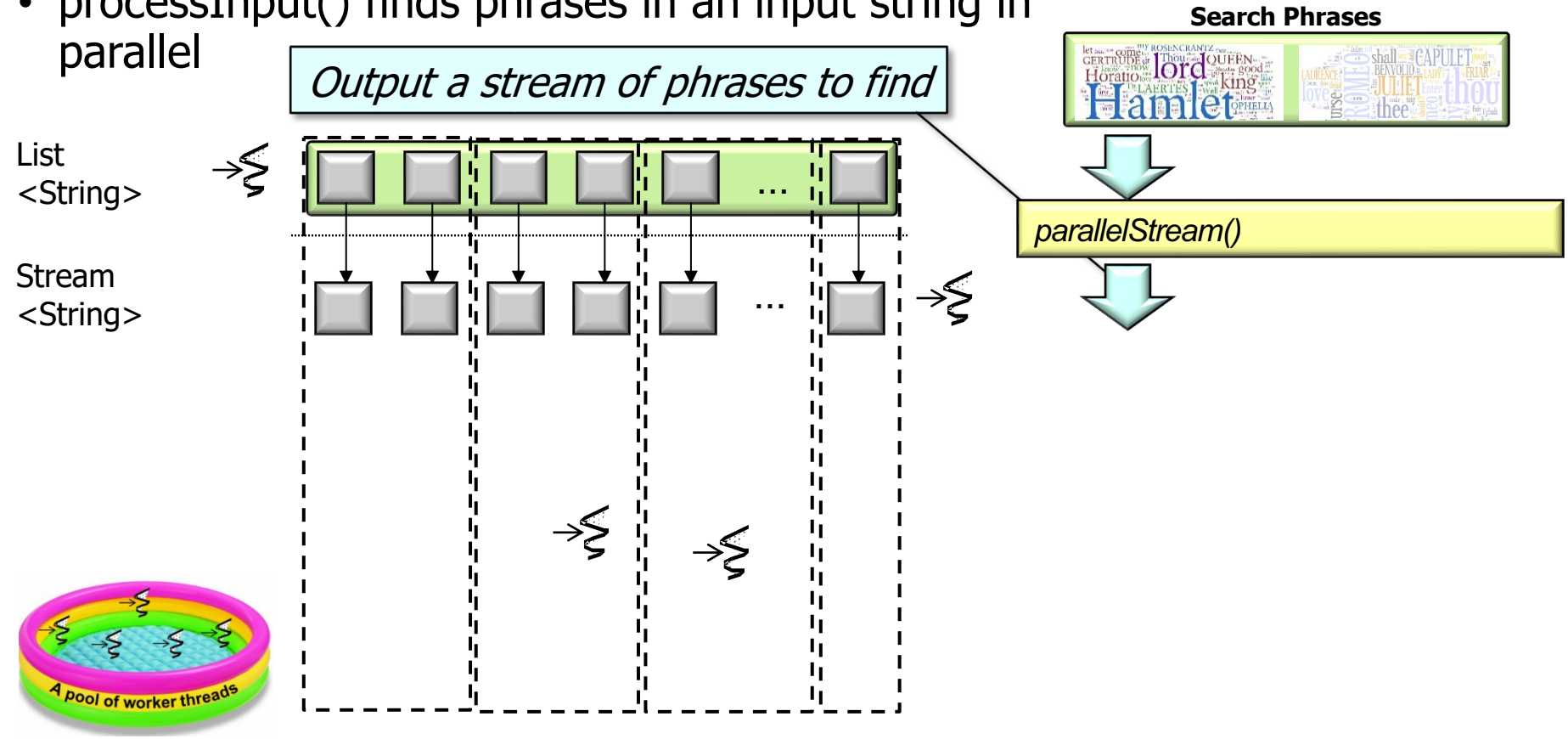




Convert a collection to a parallel stream, i.e., split into chunks of phrases

Visualizing the processInput() Method

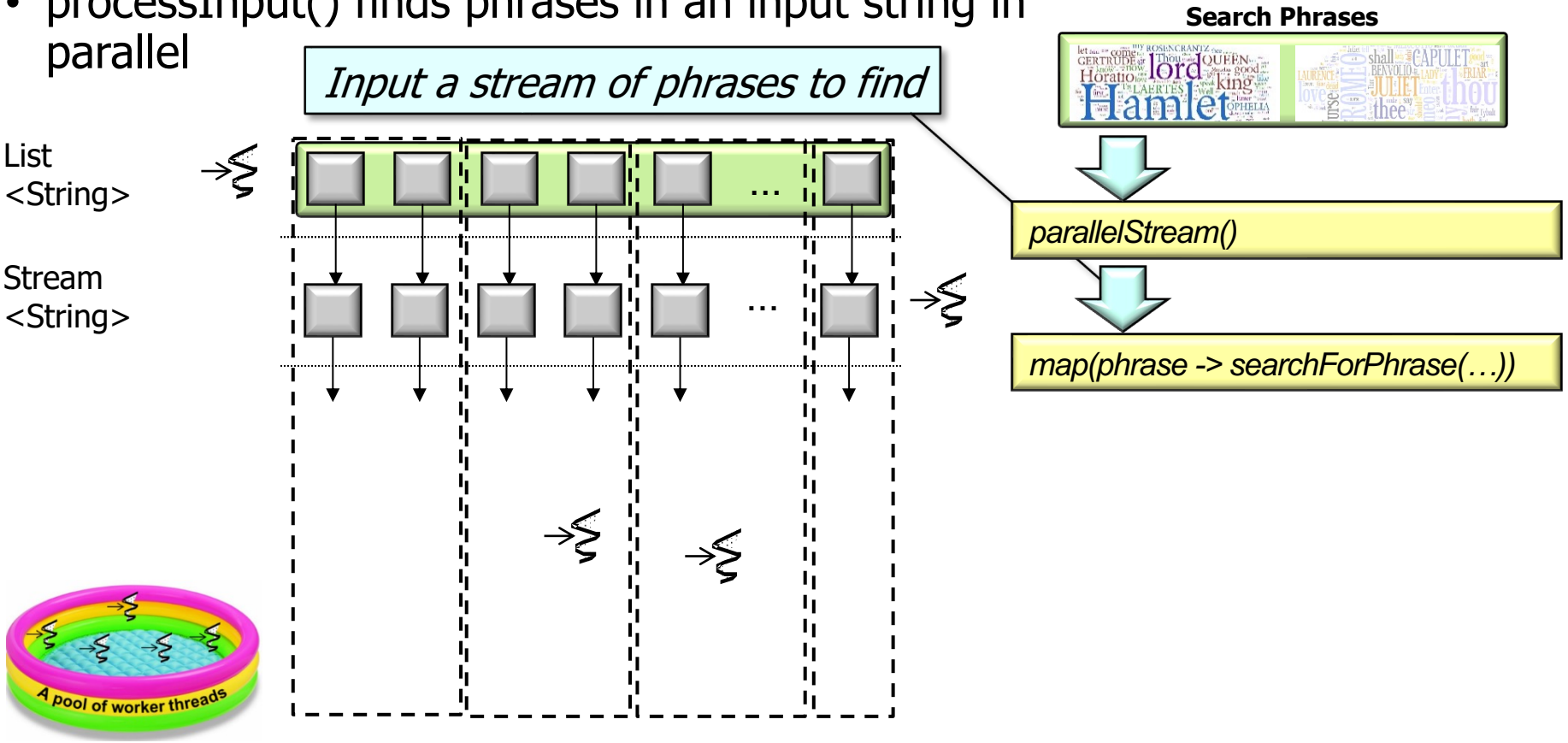
- processInput() finds phrases in an input string in parallel



Different chunks of phrases are processed in parallel on multiple worker threads & cores

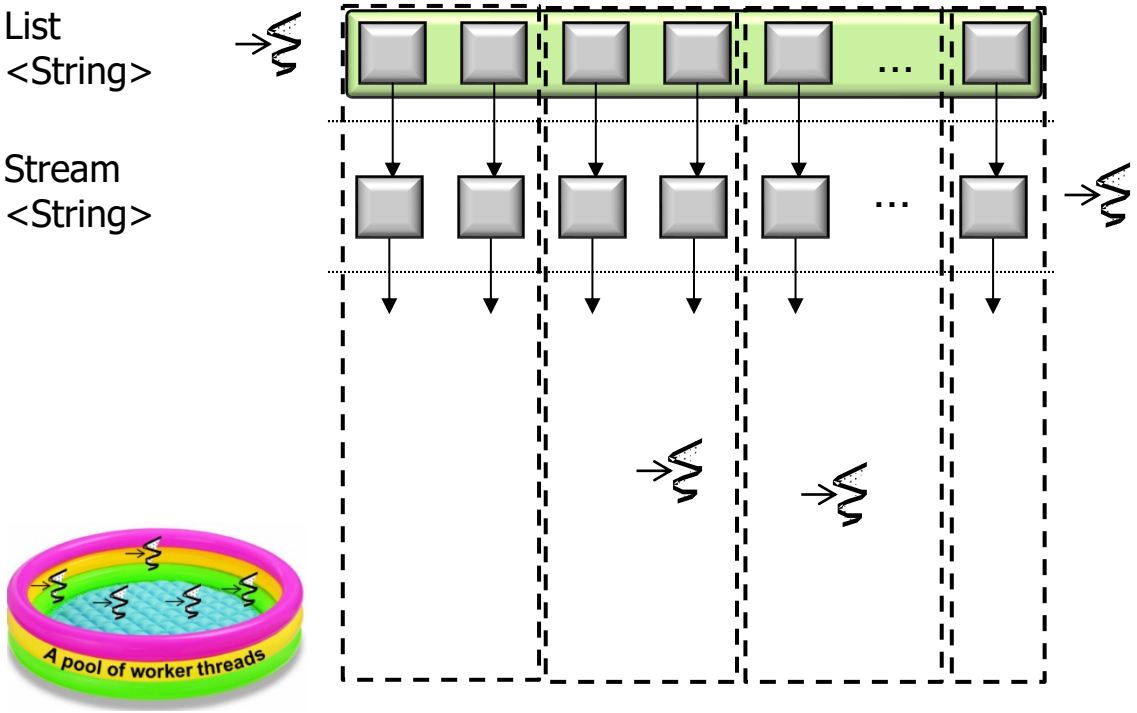
Visualizing the processInput() Method

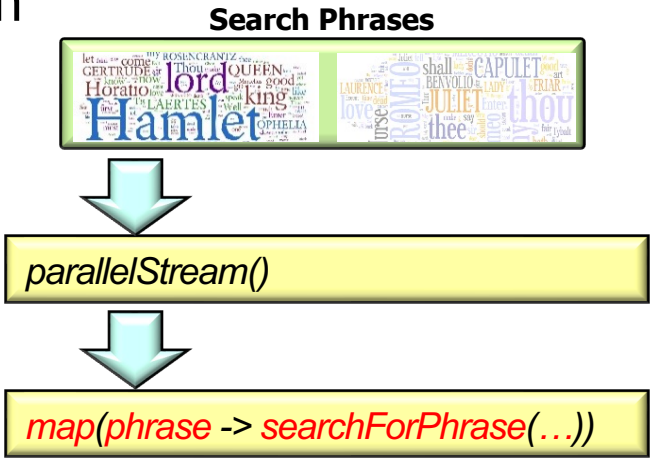
- processInput() finds phrases in an input string in parallel



Visualizing the processInput() Method

- processInput() finds phrases in an input string in parallel

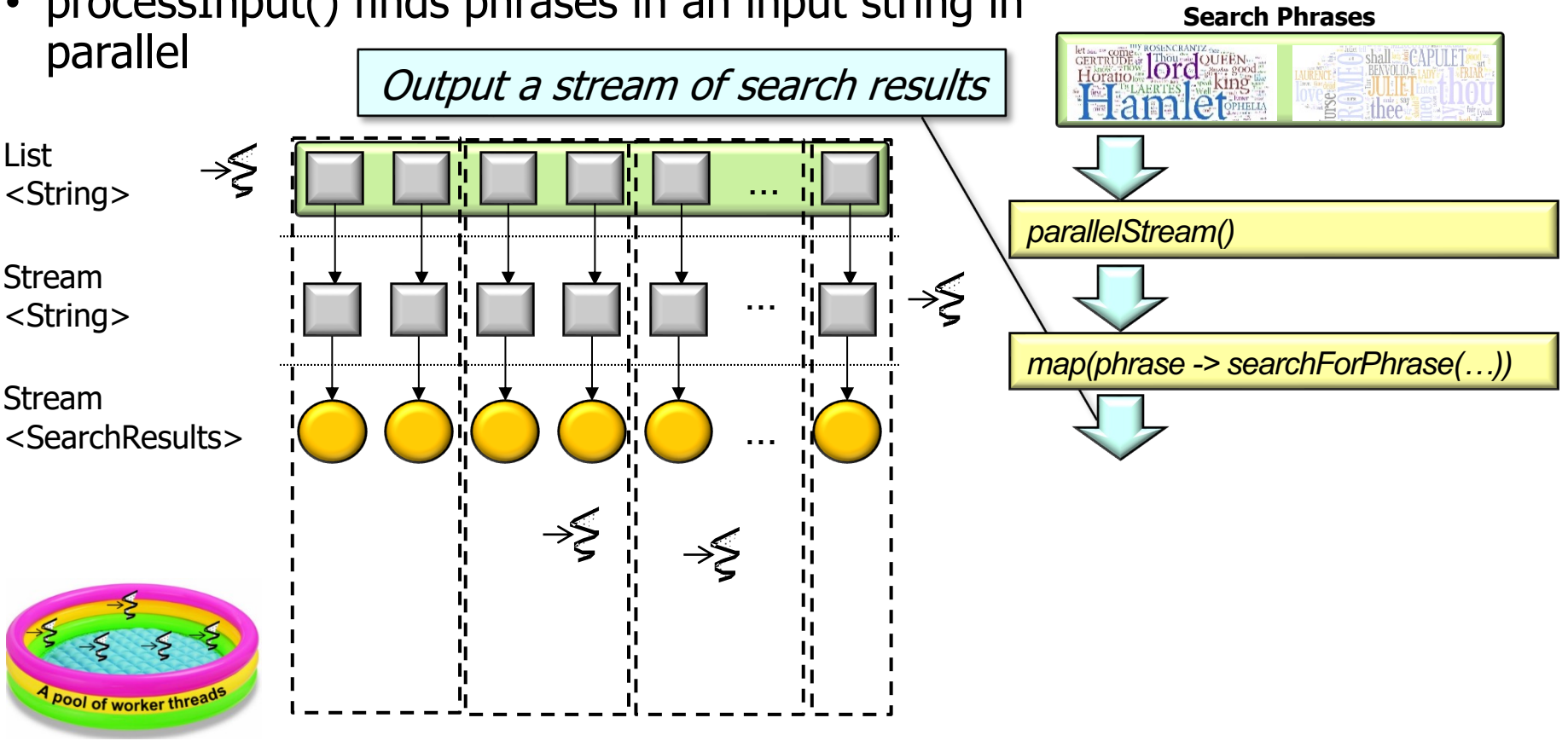




Perform parallel search for phrases in a given input string

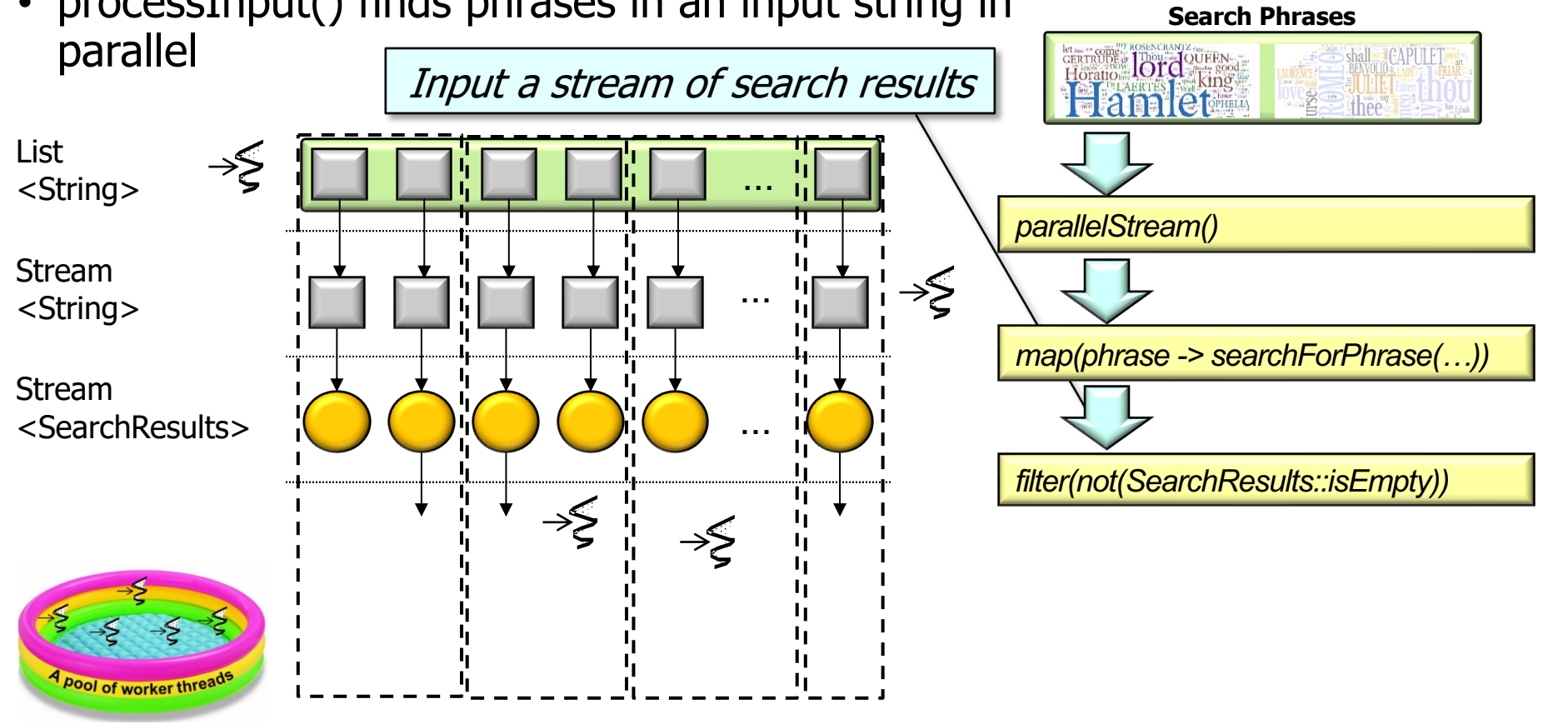
Visualizing the processInput() Method

- processInput() finds phrases in an input string in parallel



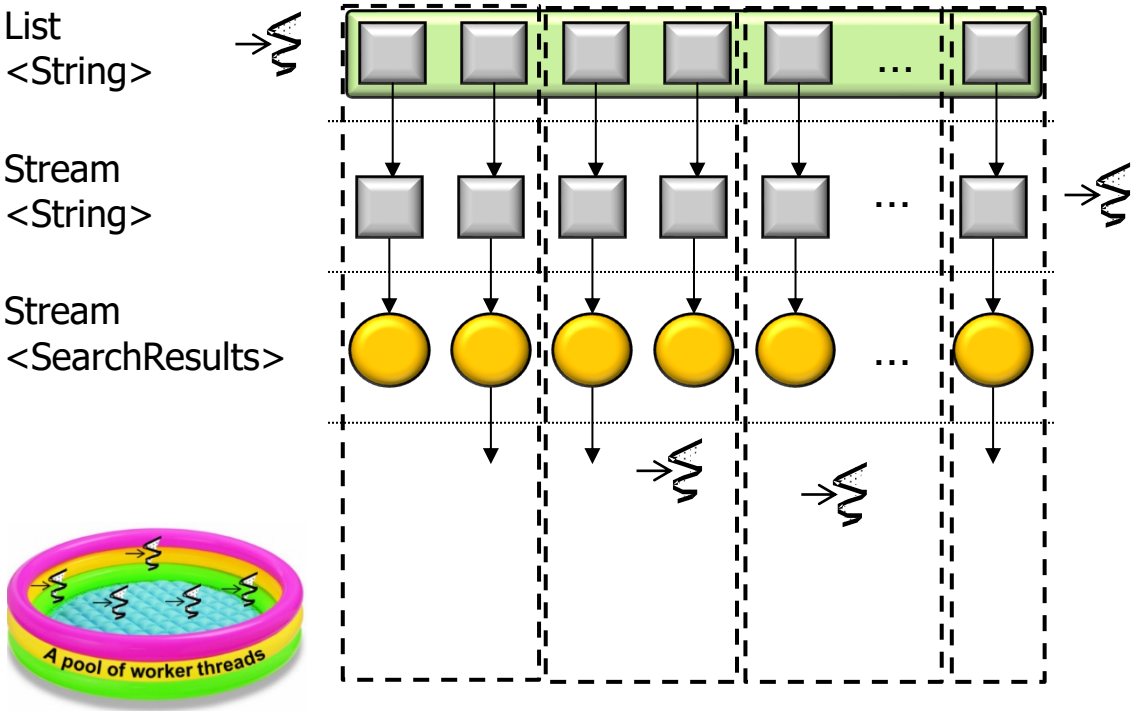
Visualizing the processInput() Method

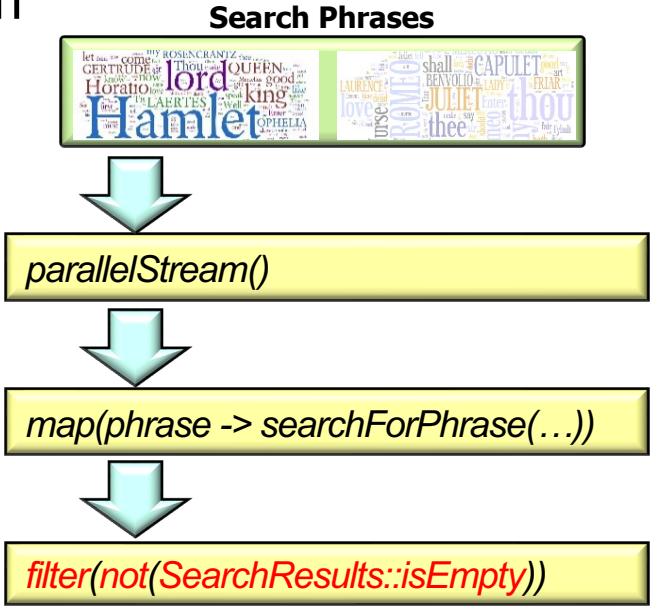
- processInput() finds phrases in an input string in parallel



Visualizing the processInput() Method

- processInput() finds phrases in an input string in parallel



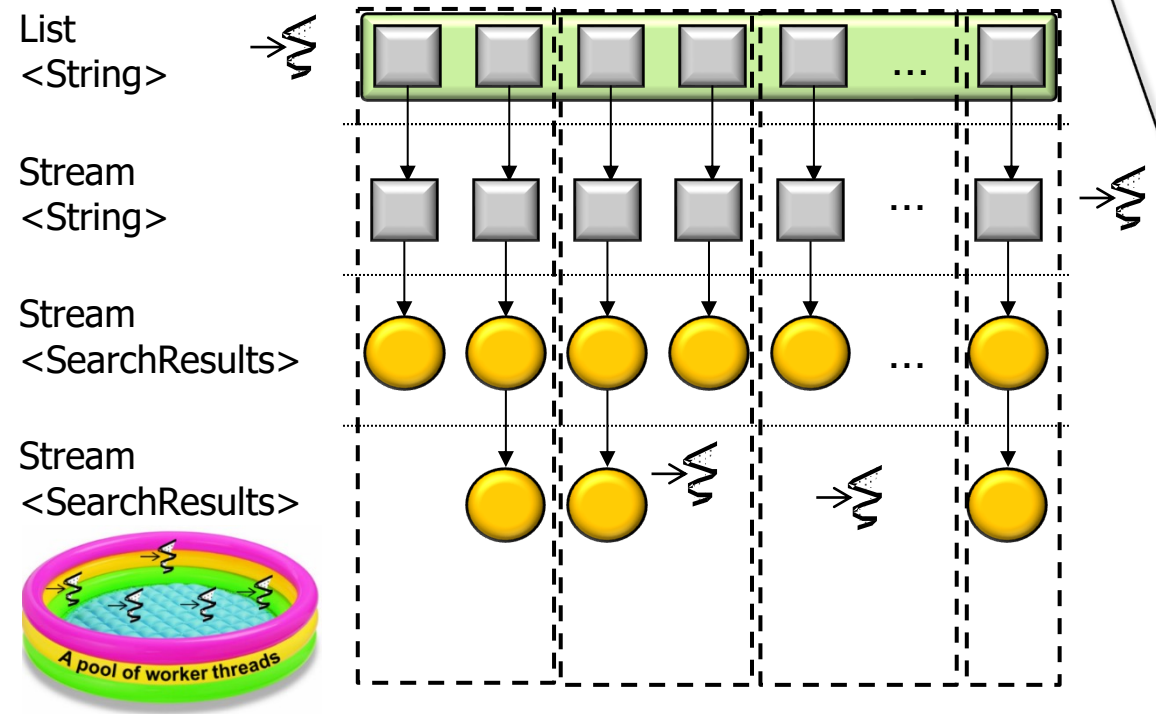


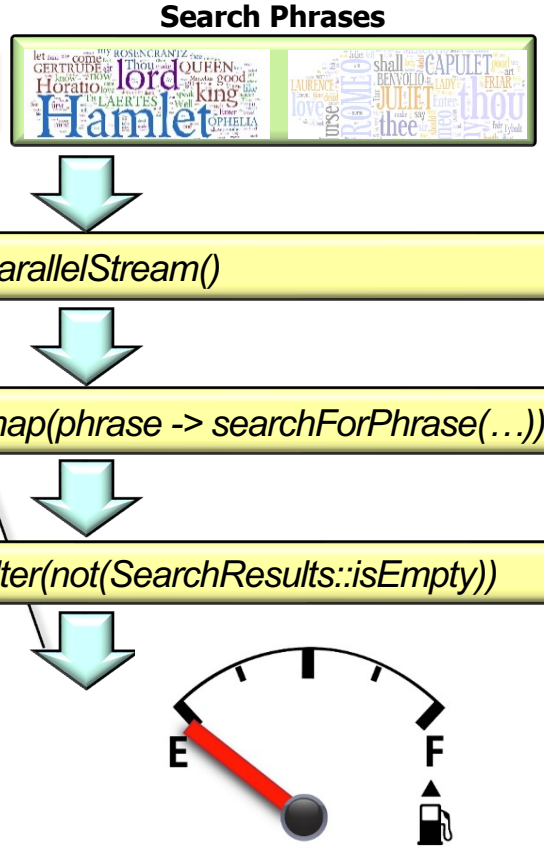
Remove empty search results from substreams in parallel

Visualizing the processInput() Method

- processInput() finds phrases in an input string in parallel

Output a stream of non-empty search results

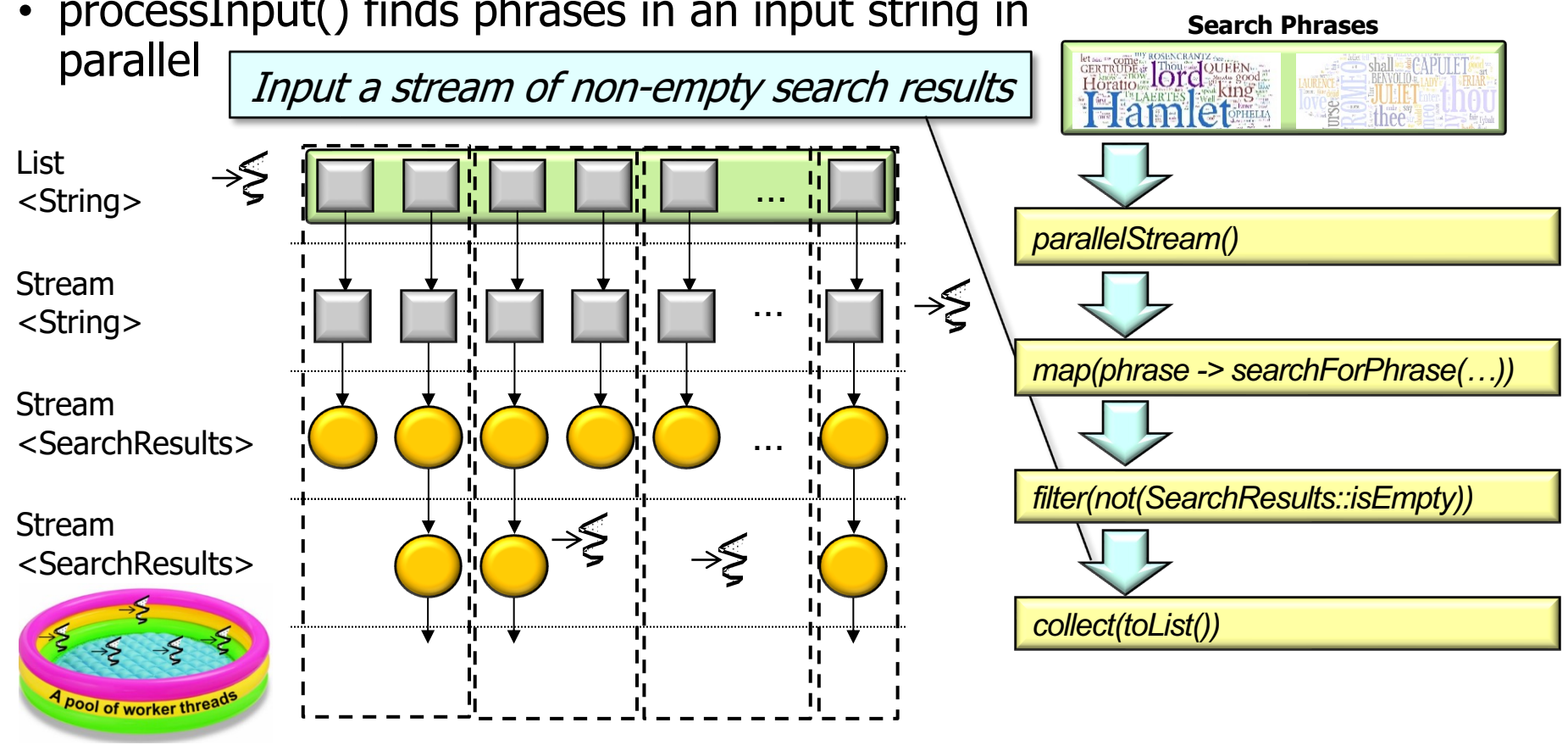




The stream of search results may be empty if no phrases matched an input string

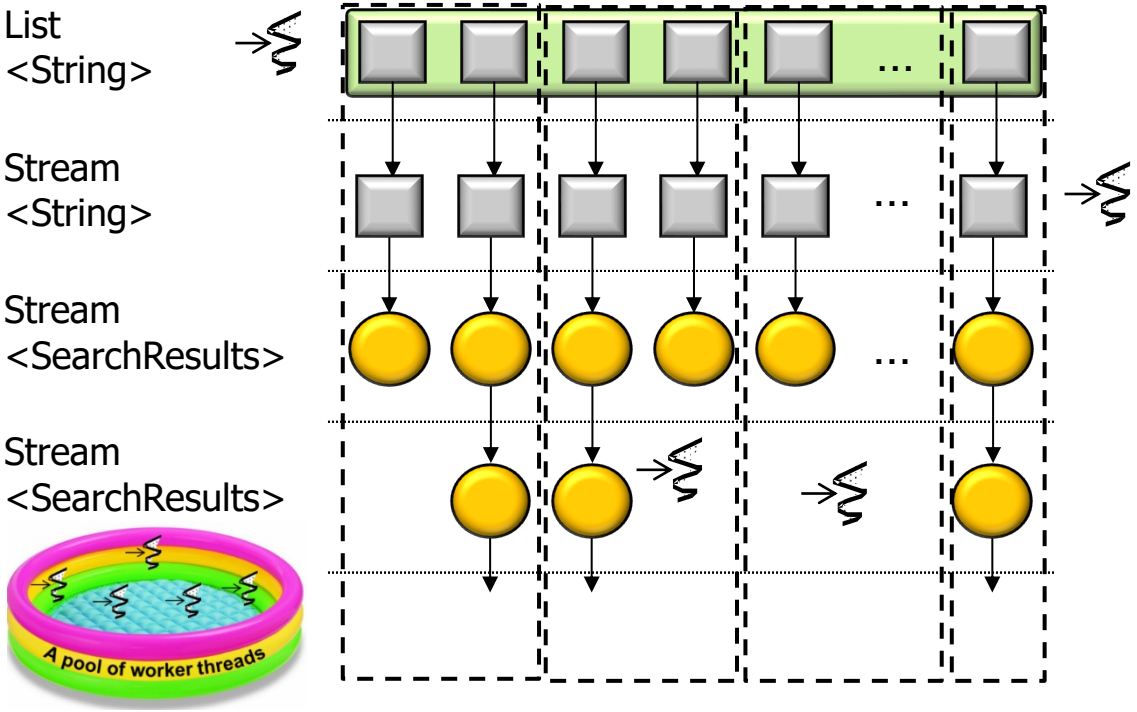
Visualizing the processInput() Method

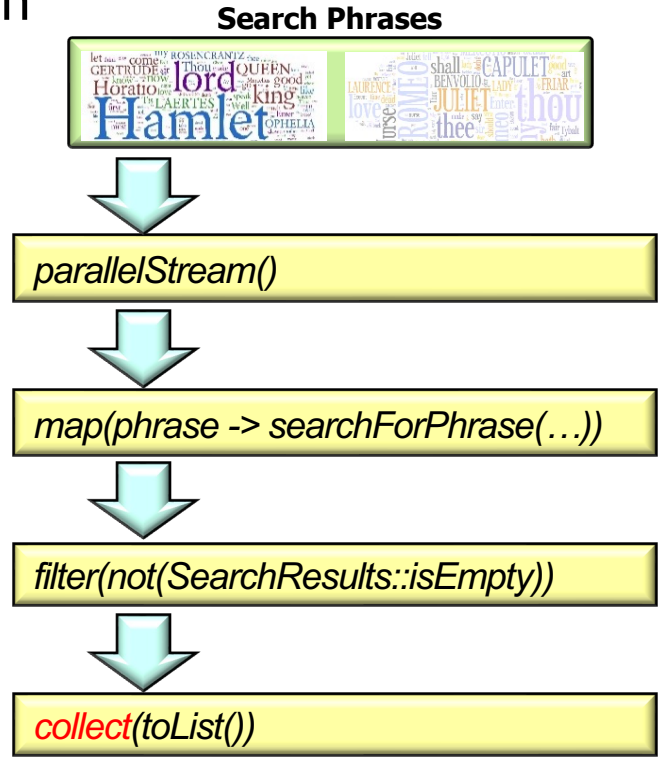
- processInput() finds phrases in an input string in parallel



Visualizing the processInput() Method

- processInput() finds phrases in an input string in parallel

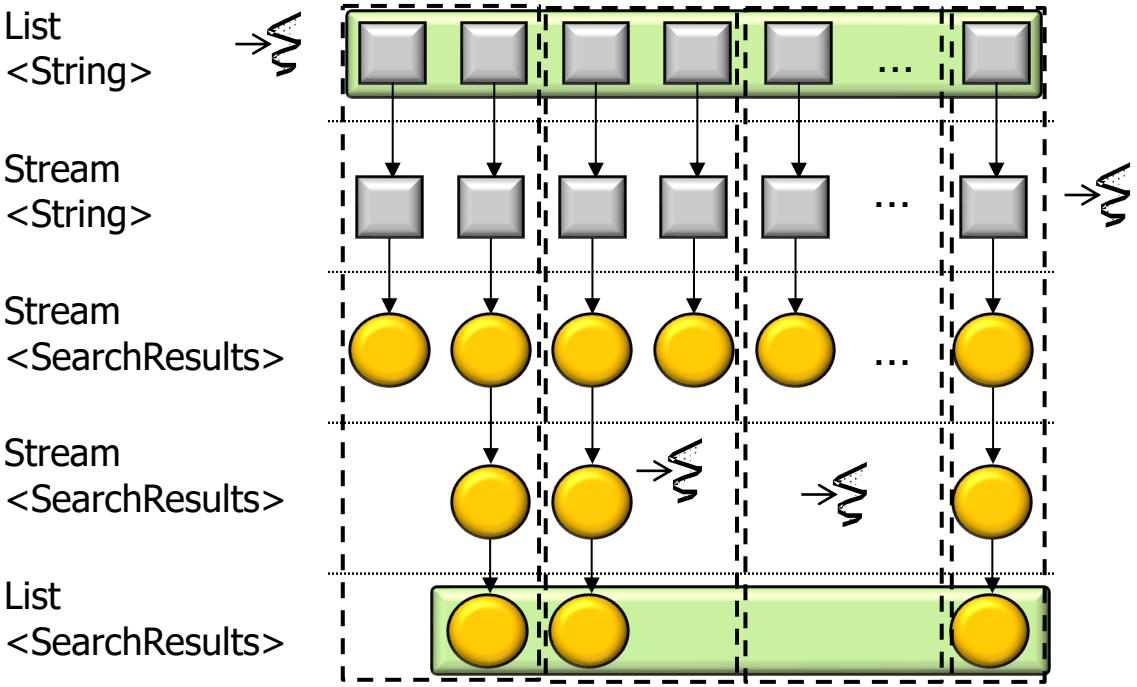


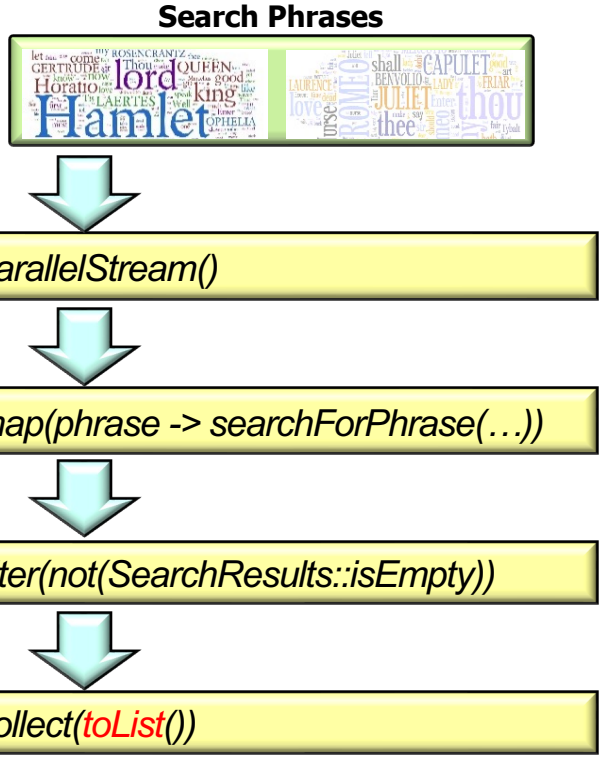


Trigger intermediate operation processing to run on multiple threads/cores

Visualizing the processInput() Method

- processInput() finds phrases in an input string in parallel

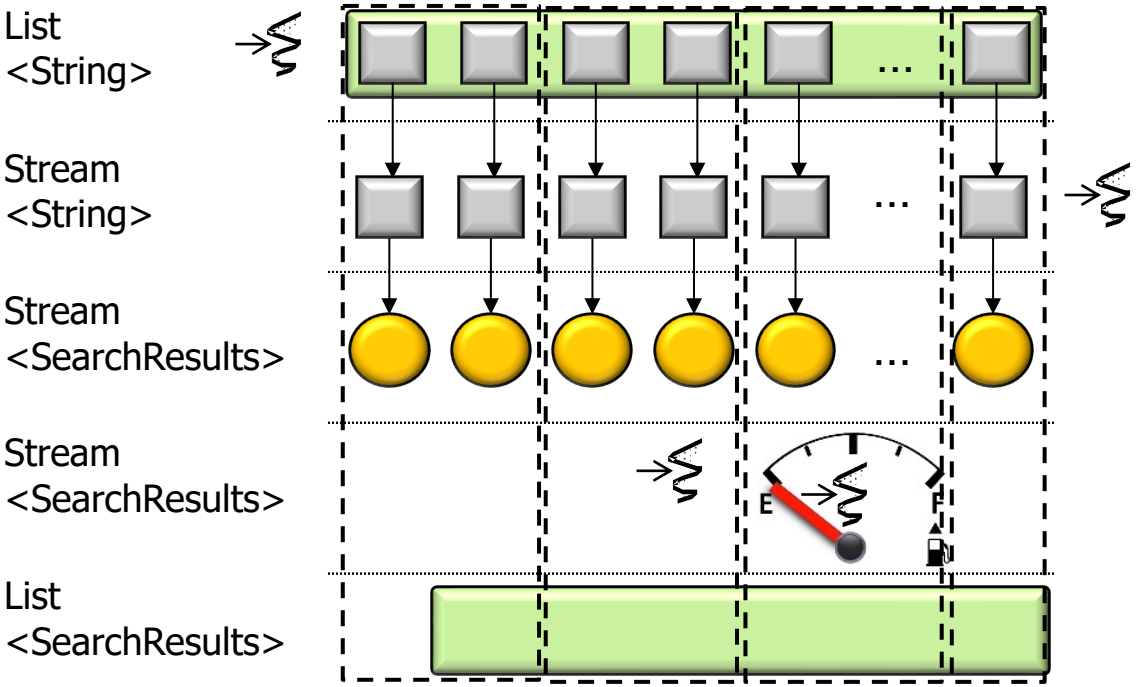


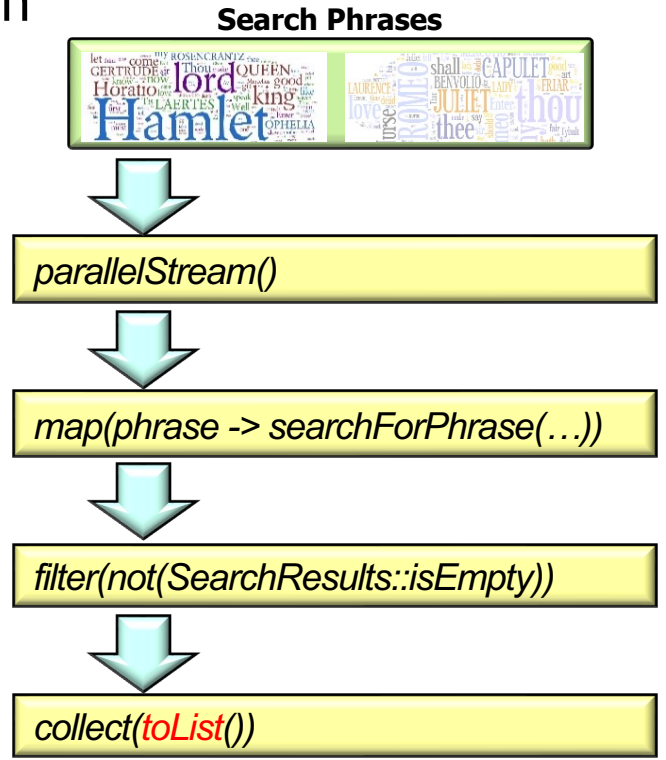


Return a list of search results in the originating thread based on "encounter order"

Visualizing the processInput() Method

- processInput() finds phrases in an input string in parallel

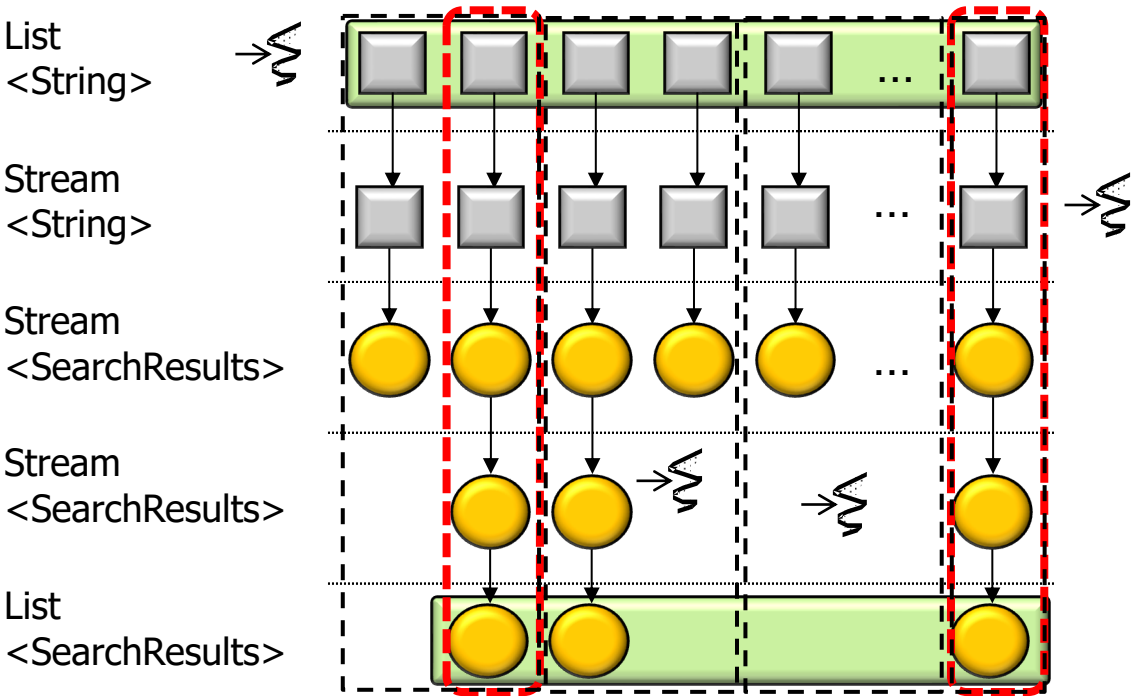


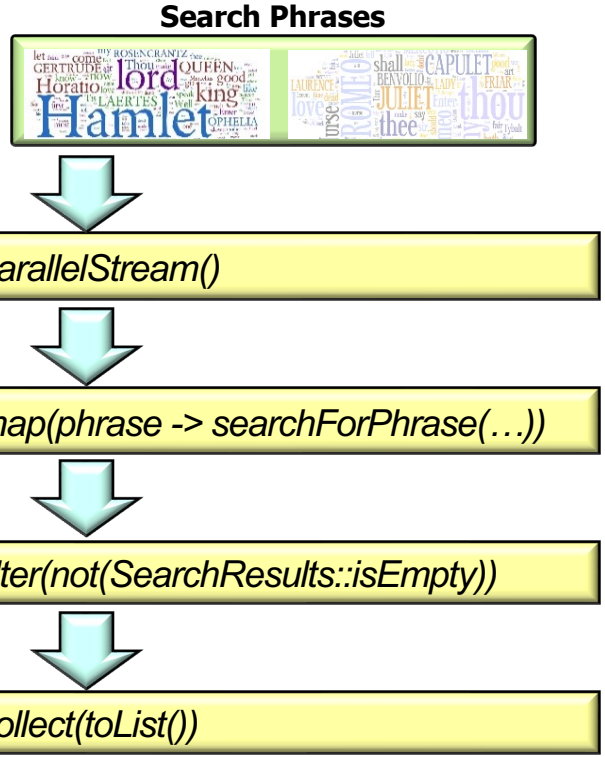


This list will be empty if none of the phrases matched the input string

Visualizing the processInput() Method

- Note that the actual processing of parallel streams differs from this visualization..





See developer.ibm.com/articles/j-java-streams-3-brian-goetz

End of Visualizing the Java SearchWithParallelStreams Hook Methods