Key Transforming Operators in the Observable Class (Part 3)

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Learning Objectives in this Part of the Lesson

- Recognize key Observable operators
  - Factory method operators
  - Transforming operators
    - Transform the values and/or types emitted by an Observable
    - Understand the RxJava flatMap() concurrency idiom

```
return Observable
   .fromIterable(bigFractionList)

   .flatMap(bf -> Observable
      .fromCallable(() -> bf
         .multiply(sBigFraction))

      .subscribeOn
         (Schedulers
          .computation()))

   .reduce(BigFraction::add)
   ...
```

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- Recognize key Observable operators
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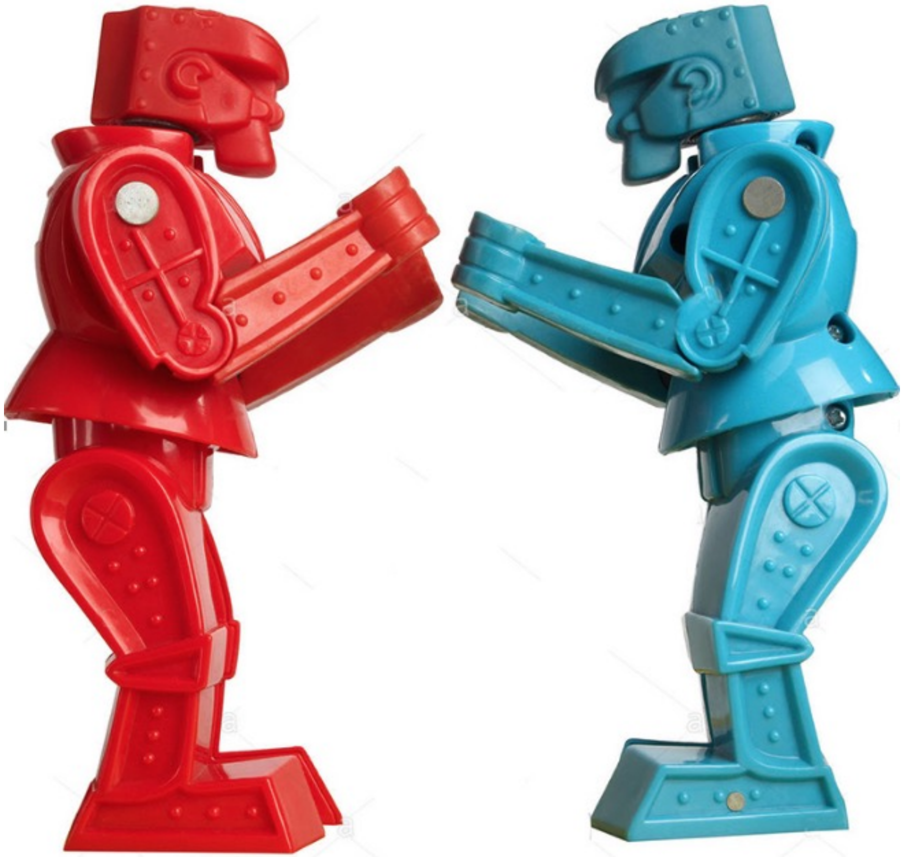
  - Transforming operators
    - Transform the values and/or types emitted by an Observable
    - Understand the RxJava flatMap() concurrency idiom
    - How how to compare & contrast flatMap() & map()



The RxJava flatMap() Concurrency Idiom

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- flatMap()'s often used when each item emitted by a stream needs to apply its own threading operators

```
return Observable
   .fromIterable(bigFractions)

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   .reduce(BigFraction::add)
   ...
```

See Reactive/Observable/ex3/src/main/java/ObservableEx.java

The RxJava flatMap() Concurrency Idiom

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  - This structure is known as the "flatMap() concurrency idiom"

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See dzone.com/articles/rxjava-idiomatic-concurrency-flatmap-vs-parallel

The RxJava flatMap() Concurrency Idiom

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Create an Observable BigFraction stream from a BigFraction List

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  .reduce(BigFraction::add)
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Iterate through the Observable stream multiplying all the big fractions in the parallel thread pool

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```

Each BigFraction in the stream is processed concurrently in a pool of worker threads

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"Lazily" emit a Callable that multiplies two BigFraction objects in a nested Observable

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   .reduce(BigFraction::add)
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```

Arrange to process each emitted Big Fraction in the computation thread pool

See next lesson on *"Key Scheduler Operators in the Observable Class (Part 2)"*

The RxJava flatMap() Concurrency Idiom

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     .subscribeOn
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  .reduce(BigFraction::add)
  ...
```

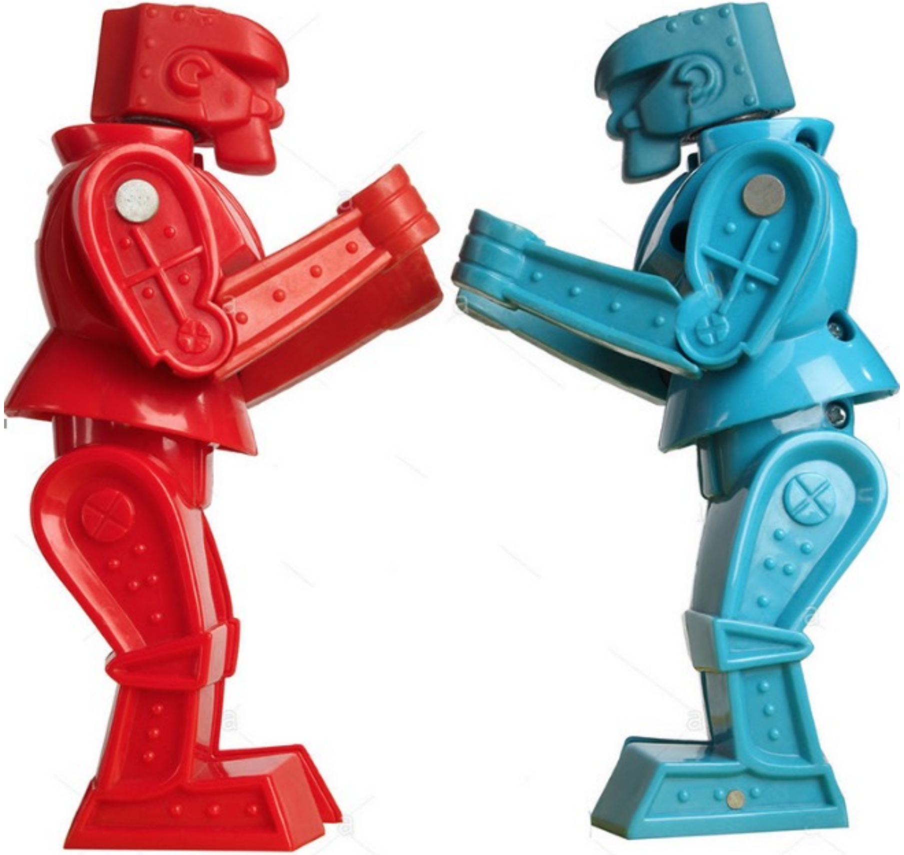
After all the concurrent processing completes then add all the Big Fractions to compute the final sum

See upcoming lesson on ` *Key Combining Operations in the Observable Class (Part 2)'*

Comparing Observable map() & flatMap()

Comparing Observable map() & flatMap()

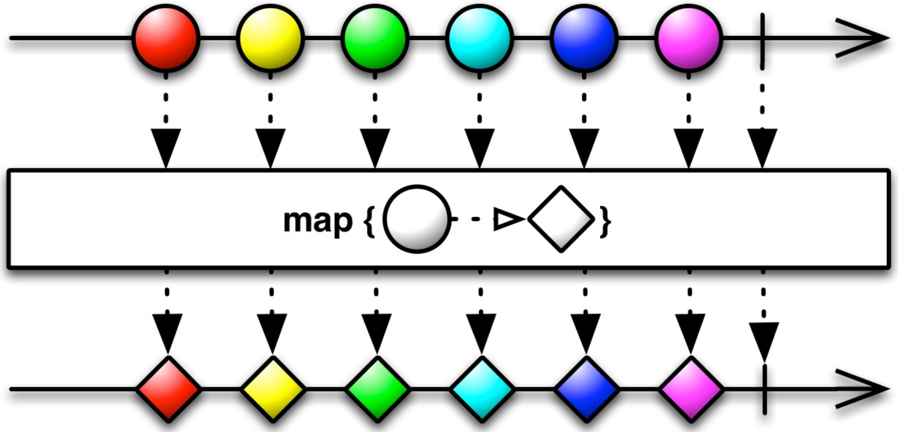
- The map() vs. flatMap() operators



See en.wikipedia.org/wiki/Rock_'Em_Sock_'Em_Robots

Comparing Observable map() & flatMap()

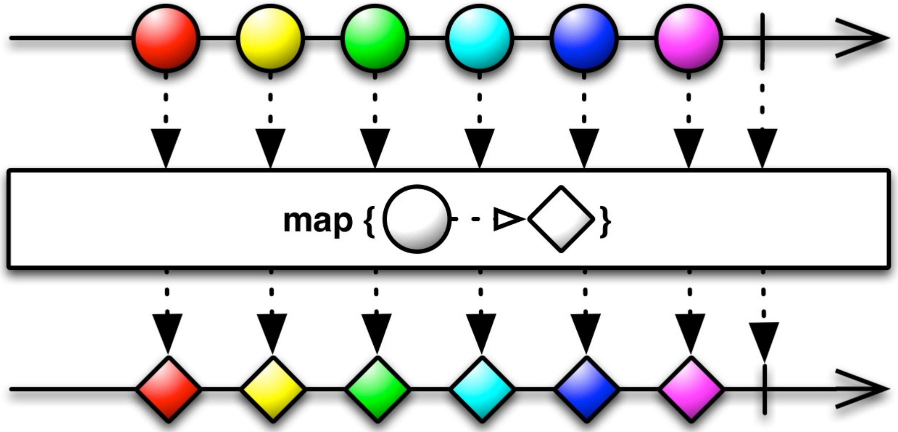
- The map() vs. flatMap() operators
  - map() transforms each value in an Observable stream into one value



See medium.com/mindorks/rxjava-operator-map-vs-flatmap-427c09678784

Comparing Observable map() & flatMap()

- The map() vs. flatMap() operators
  - map() transforms each value in an Observable stream into one value
    - e.g., used for synchronous 1-to-1 transformations

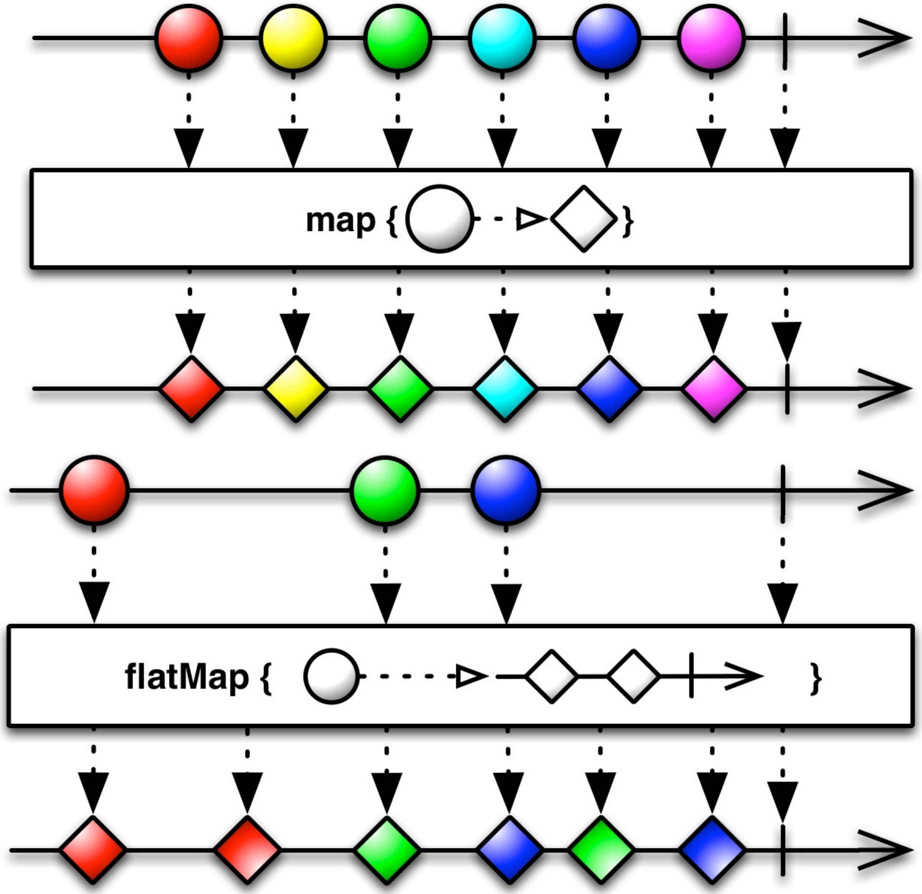


=

The # of output elements equal the # of input elements

Comparing Observable map() & flatMap()

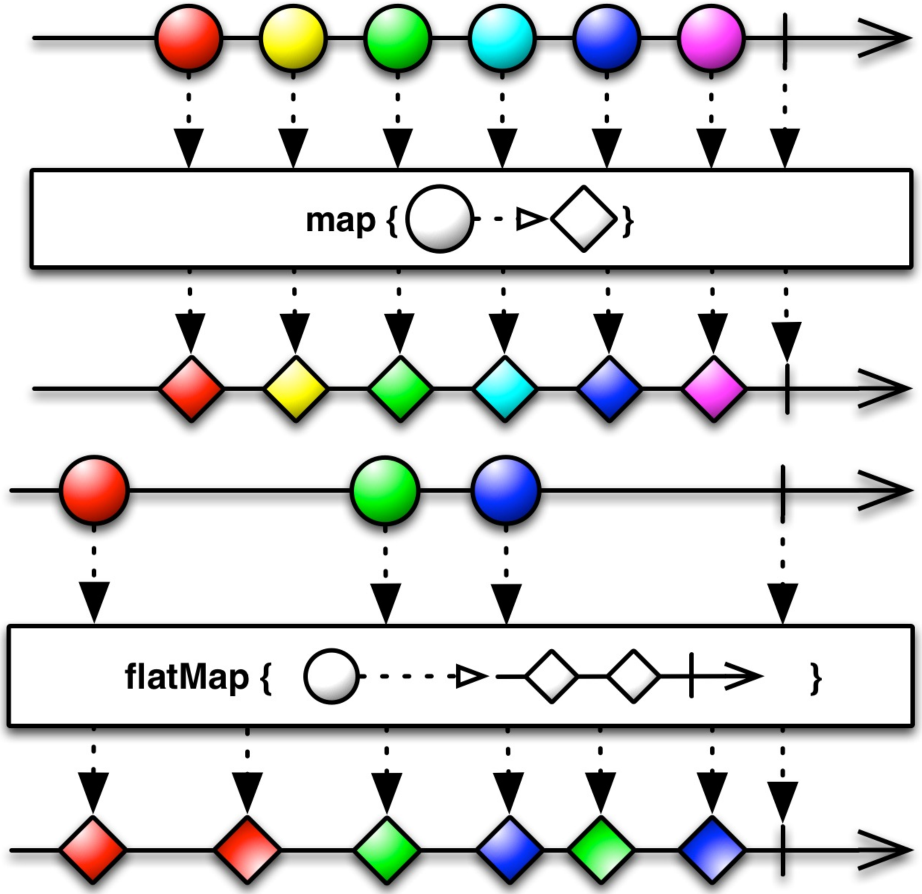
- The map() vs. flatMap() operators
  - map() transforms each value in an Observable stream into one value
  - flatMap() transforms each value in an Observable stream into an arbitrary number (0+) values



See medium.com/mindorks/rxjava-operator-map-vs-flatmap-427c09678784

Comparing Observable map() & flatMap()

- The map() vs. flatMap() operators
  - map() transforms each value in an Observable stream into one value
  - flatMap() transforms each value in an Observable stream into an arbitrary number (0+) values
    - e.g., intended for asynchronous 1-to-N transformations



The # of output elements may differ from the # of input elements

Comparing Observable map() & flatMap()

- The map() vs. flatMap() operators
  - map() transforms each value in an Observable stream into one value
  - flatMap() transforms each value in an Observable stream into an arbitrary number (0+) values
  - flatMap() is used extensively in RxJava

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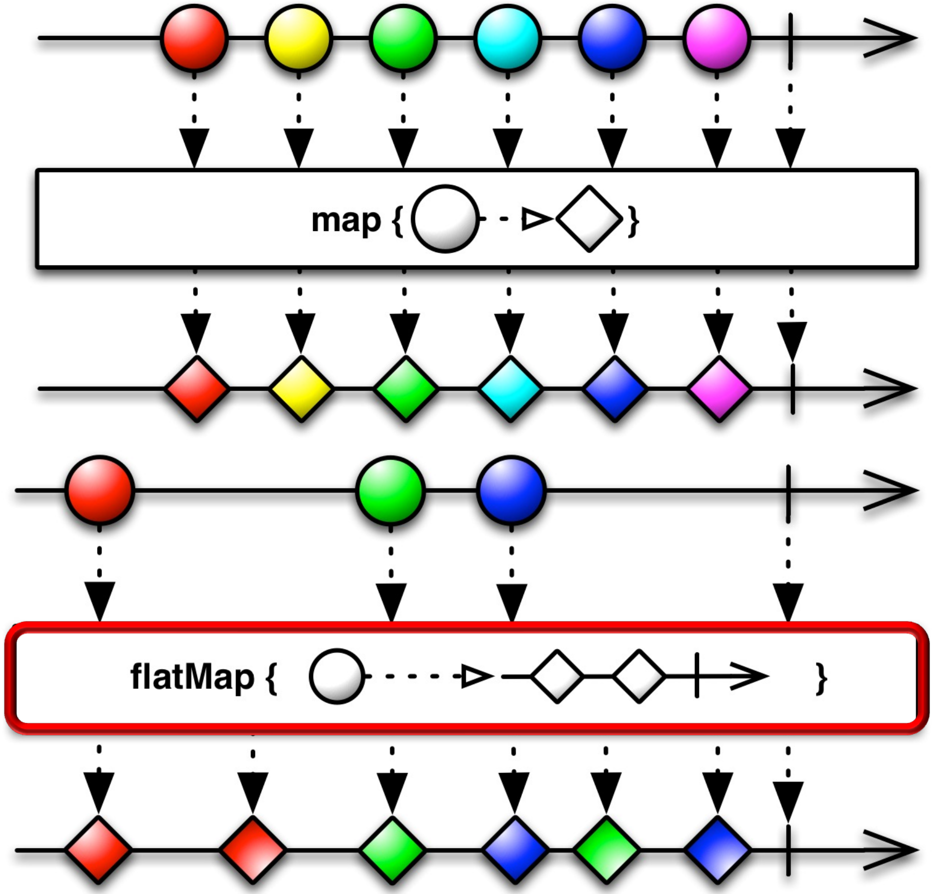

End of Key Transforming Operators in the Observable Class (Part 3)