Key Transforming Operators in the Flux Class (Part 3)

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Learning Objectives in this Part of the Lesson

- Recognize key Flux operators
  - Factory method operators
  - Transforming operators
    - Transform the values and/or types emitted by a Flux
      - e.g., flatMap()


```
return Flux
  .fromIterable(bigFractions)

  .flatMap(bf -> Mono
        .fromCallable(() -> bf
           .multiply(sBigFrac))

        .subscribeOn
           (Schedulers
            .parallel()))

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

We explain the Project Reactor "flatMap() concurrency idiom"

This idiom is particularly useful for "embarrassing parallel" programs

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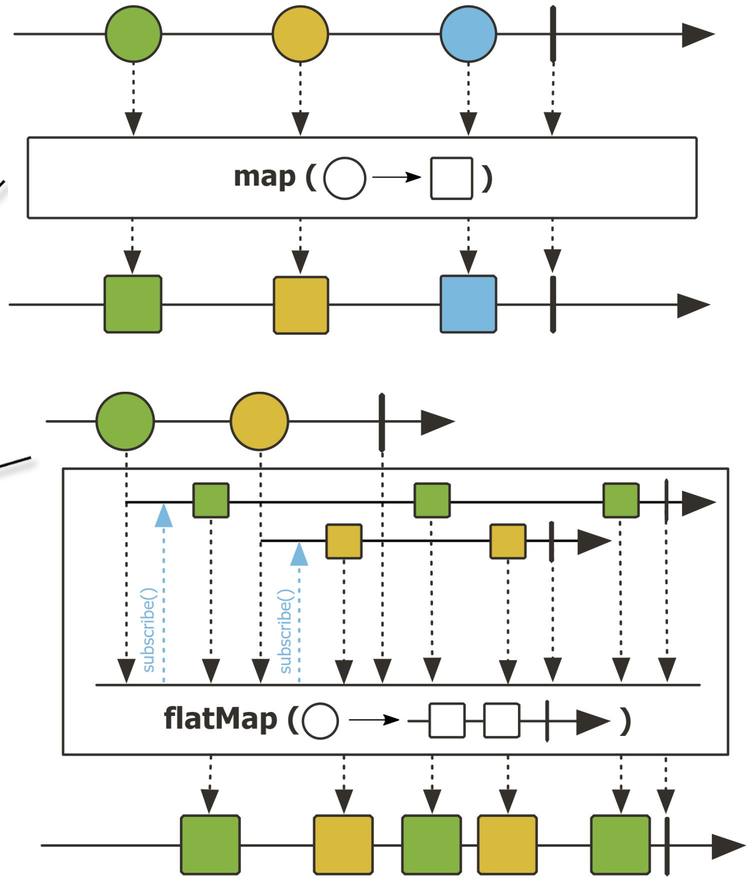
We also compare & contrast the Project Reactor map() & flatMap() operators



The Project Reactor 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


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See ebaytech.berlin/declarative-concurrency-with-reactor-70507e04054a

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Create a Flux BigFraction stream from a BigFraction list

See Reactive/flux/ex3/src/main/java/FluxEx.java

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Iterate thru the Flux stream multiplying big fractions in the parallel thread pool

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Each BigFraction in the stream is processed concurrently in the parallel thread pool

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Multiply each BigFraction in a thread from the parallel thread pool

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Arrange to process each emitted BigFraction in the parallel thread pool

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

Comparing map & flatMap()

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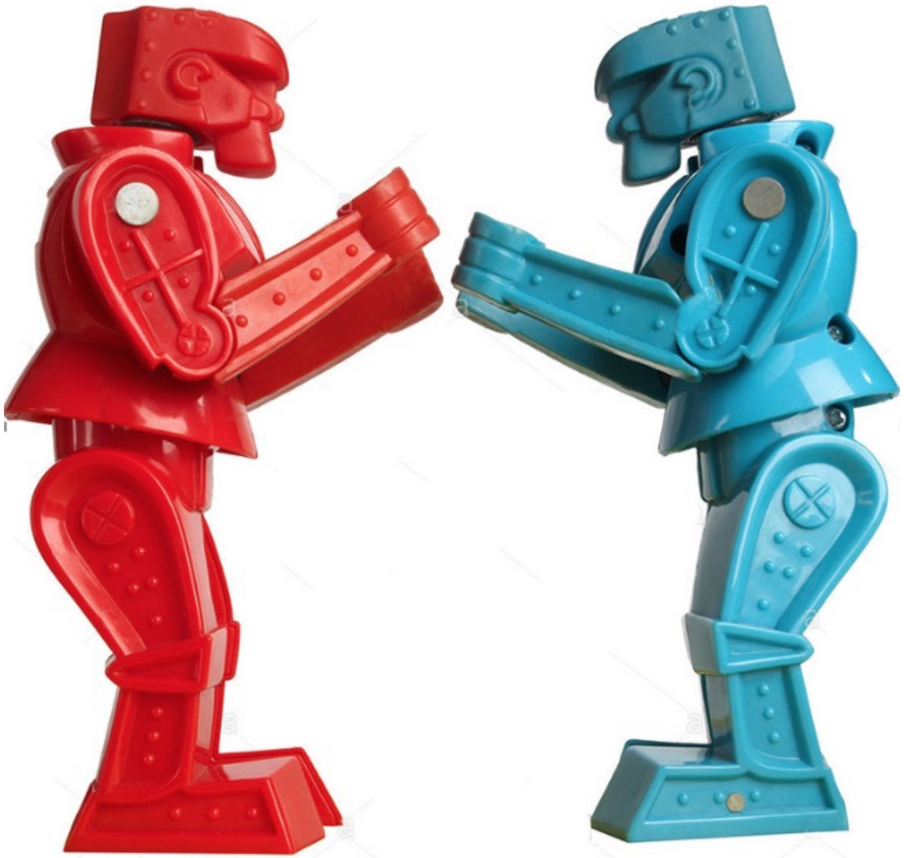
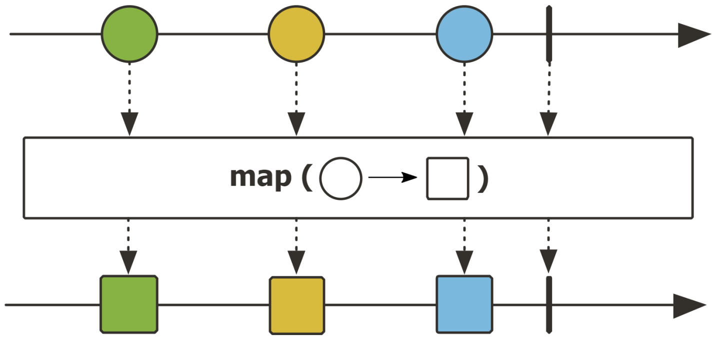
- The map() vs. flatMap() operators



Comparing map() & flatMap()

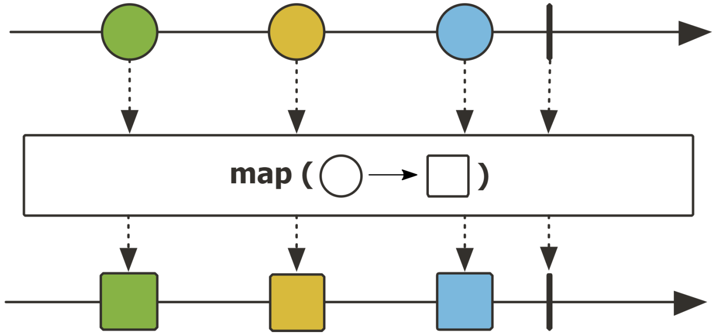
- The map() vs. flatMap() operators
  - The map() operator transforms each value in a Flux stream into a single value



See stackoverflow.com/questions/49115135/map-vs-flatmap-in-reactor

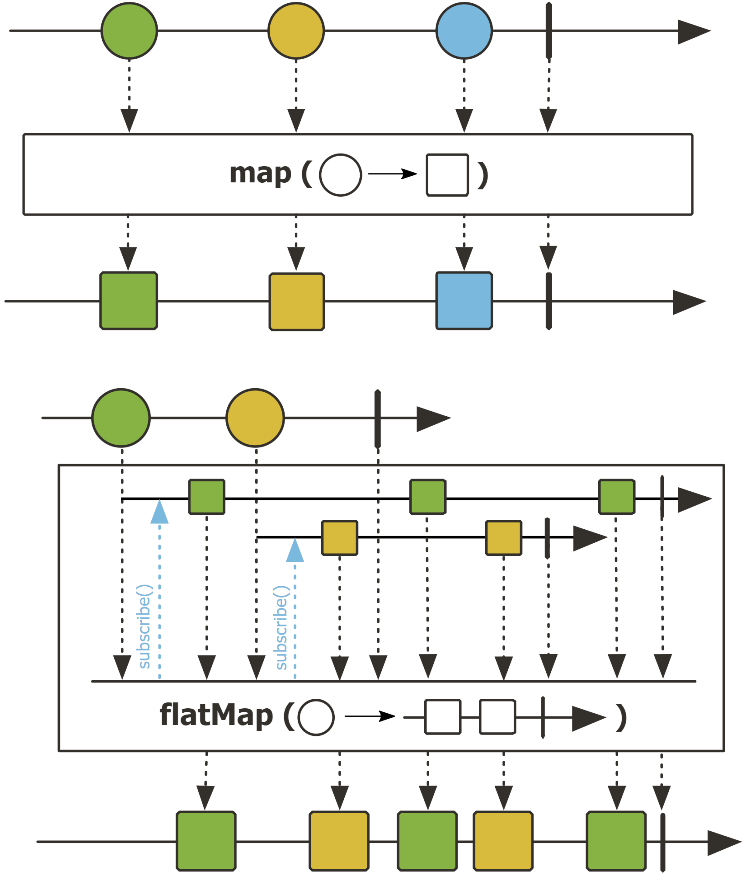
Comparing map() & flatMap()

- The map() vs. flatMap() operators
  - The map() operator transforms each value in a Flux stream into a single value
    - i.e., intended for synchronous, (non-) blocking, 1-to-1 transformations



Comparing map() & flatMap()

- The map() vs. flatMap() operators
  - The map() operator transforms each value in a Flux stream into a single value
  - The flatMap() operator transforms each value in a Flux stream into an arbitrary number (zero or more) values



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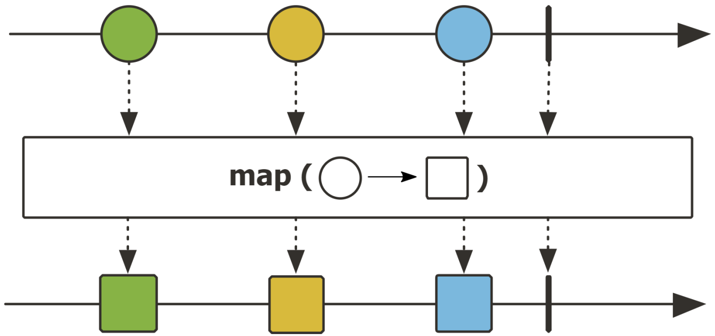
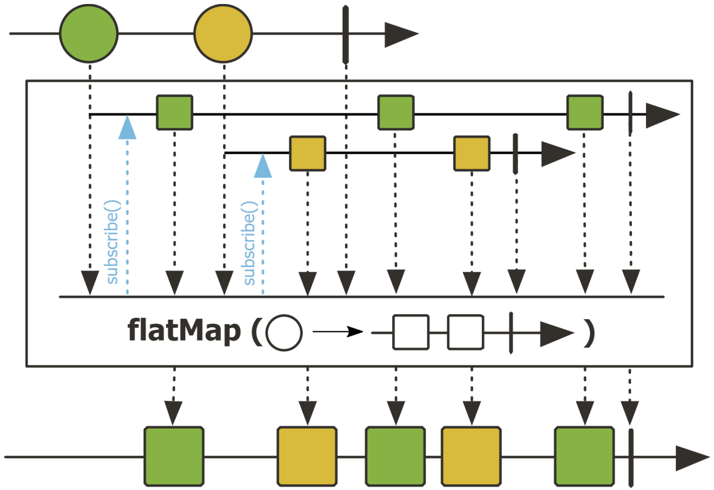
Comparing map() & flatMap()

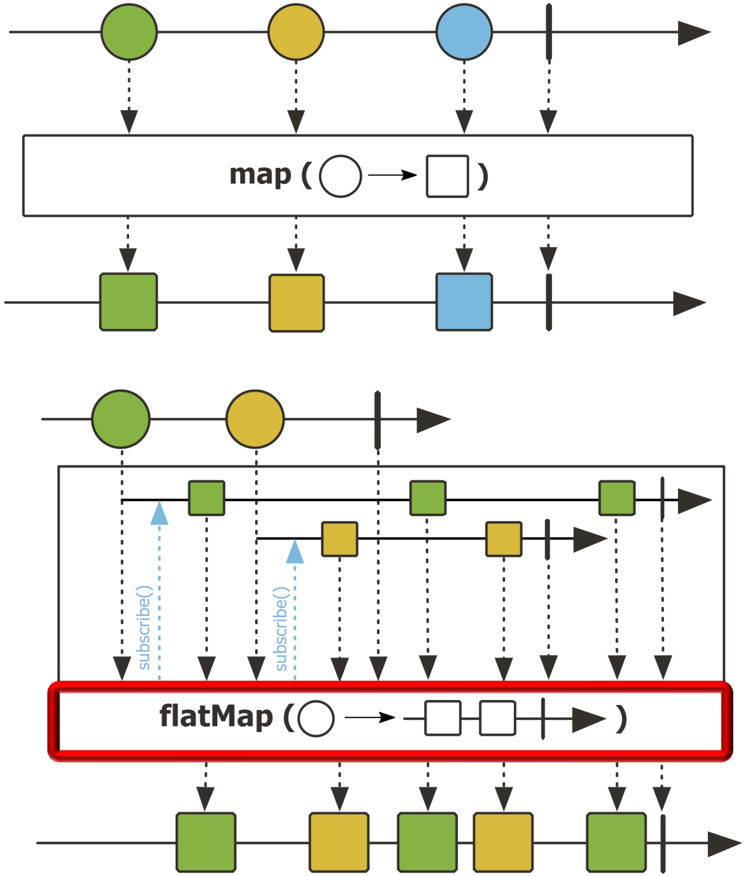
- The map() vs. flatMap() operators
  - The map() operator transforms each value in a Flux stream into a single value
  - The flatMap() operator transforms each value in a Flux stream into an arbitrary number (zero or more) values
    - i.e., intended for asynchronous (often non-blocking) 1-to-N transformations





Comparing map() & flatMap()

- The map() vs. flatMap() operators
  - The map() operator transforms each value in a Flux stream into a single value
  - The flatMap() operator transforms each value in a Flux stream into an arbitrary number (zero or more) values
  - flatMap() is used extensively in Project Reactor



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