Key Factory Method 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
    - These operators create Flux streams in various ways
      - e.g., generate()

See en.wikipedia.org/wiki/Factory_method_pattern

Key Factory Method Operators in the Flux Class

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- The generate() operator
  - Create a Flux by generating signals 1-by-1 via a callback

```
static <T> Flux<T> generate
   (Consumer<SynchronousSink<T>>
    generator)
```

See projectreactor.io/docs/core/release/api/reactor/core/publisher/Flux.html#generate

Key Factory Method Operators in the Flux Class

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  - Create a Flux by generating signals 1-by-1 via a callback
    - The Consumer param is called in a loop after a downstream Subscriber has subscribed

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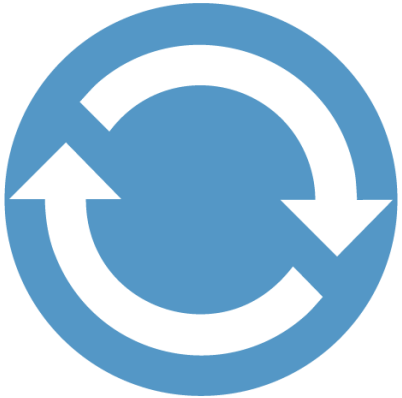

Interface Consumer<T>

Type Parameters:

T - the type of the input to the operation

All Known Subinterfaces:

Stream.Builder<T>

Functional Interface:

This is a functional interface and can therefore be used as the assignment target for a lambda expression or method reference.

See docs.oracle.com/javase/8/docs/api/java/util/function/Consumer.html

Key Factory Method Operators in the Flux Class

- The generate() operator
  - Create a Flux by generating signals 1-by-1 via a callback
    - The Consumer param is called in a loop after a downstream Subscriber has subscribed
      - The callback should call next(), error(), or complete() on a SynchronousSink to signal a value or a terminal event

```
static <T> Flux<T> generate
  (Consumer<SynchronousSink<T>>
   generator)
```

`public interface SynchronousSink<T>`

Interface to produce synchronously "one signal" to an underlying `Subscriber`.

At most one `next(T)` call and/or one `complete()` or `error(Throwable)` should be called per invocation of the generator function.

Calling a `SynchronousSink` outside of a generator consumer or function, e.g. using an async callback, is forbidden. You can `FluxSink` or `MonoSink` based generators for these situations.

Method Summary

All Methods | Instance Methods | Abstract Methods

Modifier and Type	Method and Description
void	`complete()`
`Context`	`currentContext()` Return the current subscriber `Context`.
void	`error(Throwable e)`
void	`next(T t)` Try emitting, might throw an unchecked exception.

See projectreactor.io/docs/core/release/api/reactor/core/publisher/SynchronousSink.html

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  - The new Flux instance is returned

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  - Create a Flux by generating signals 1-by-1 via a callback
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      - This Flux is "cold," which only emits item upon subscription

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static <T> Flux<T> generate
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See www.vinsguru.com/reactor-hot-publisher-vs-cold-publisher

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- The generate() operator
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    - The Consumer param is called in a loop after a downstream Subscriber has subscribed
    - The new Flux instance is returned
      - This Flux is "cold," which only emits item upon subscription
      - Each observer has its own set of items emitted to it

```
static <T> Flux<T> generate
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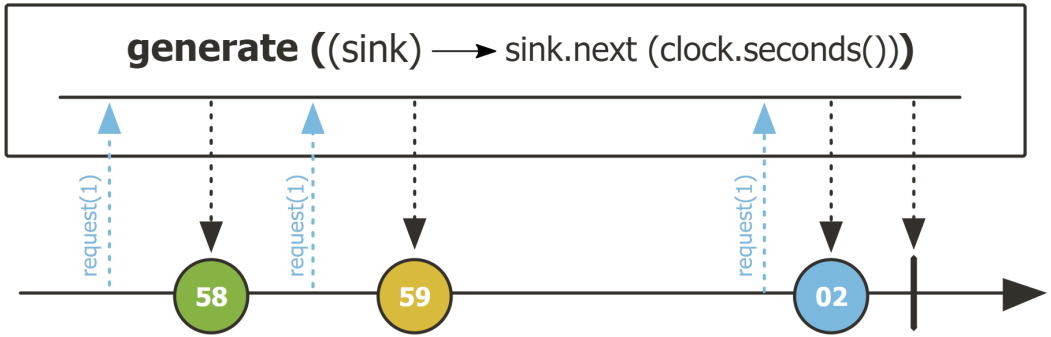
```

Key Factory Method Operators in the Flux Class

- The generate() operator
  - Create a Flux by generating signals 1-by-1 via a callback
  - It is only allowed to generate one event at a time, which supports backpressure




```
Flux
   .generate((SynchronousSink<BigFraction> sink) -> sink
             .next(BigFractionUtils
                   .makeBigFraction(sRANDOM,
                                    false)))
   ...
```

See www.java-allandsundry.com/2020/07/backpressure-in-project-reactor.html

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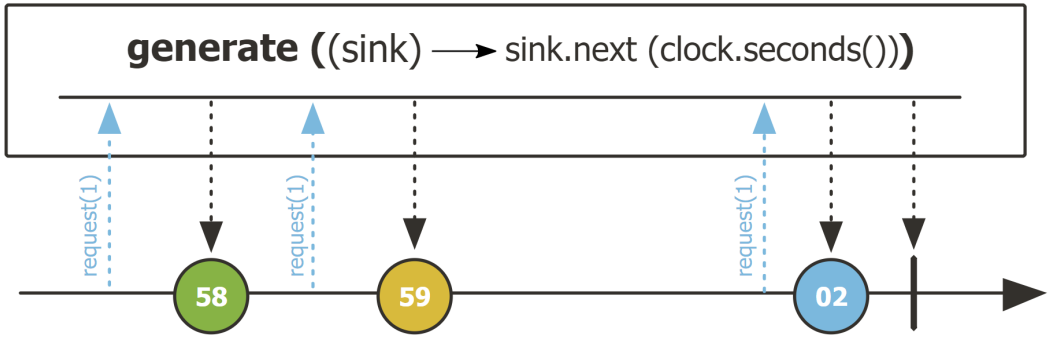


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Flux
   .generate((SynchronousSink<BigFraction> sink) -> sink
                .next(BigFractionUtils
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                                       false)))
   ...
```

Generate an infinite stream of random unreduced big fractions

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

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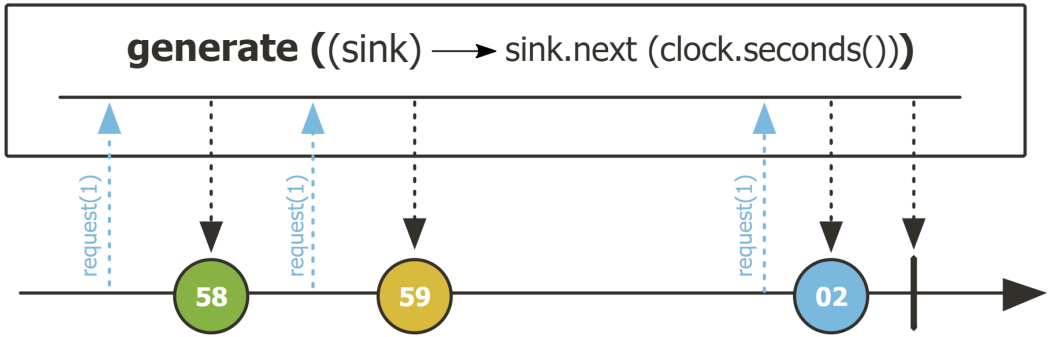


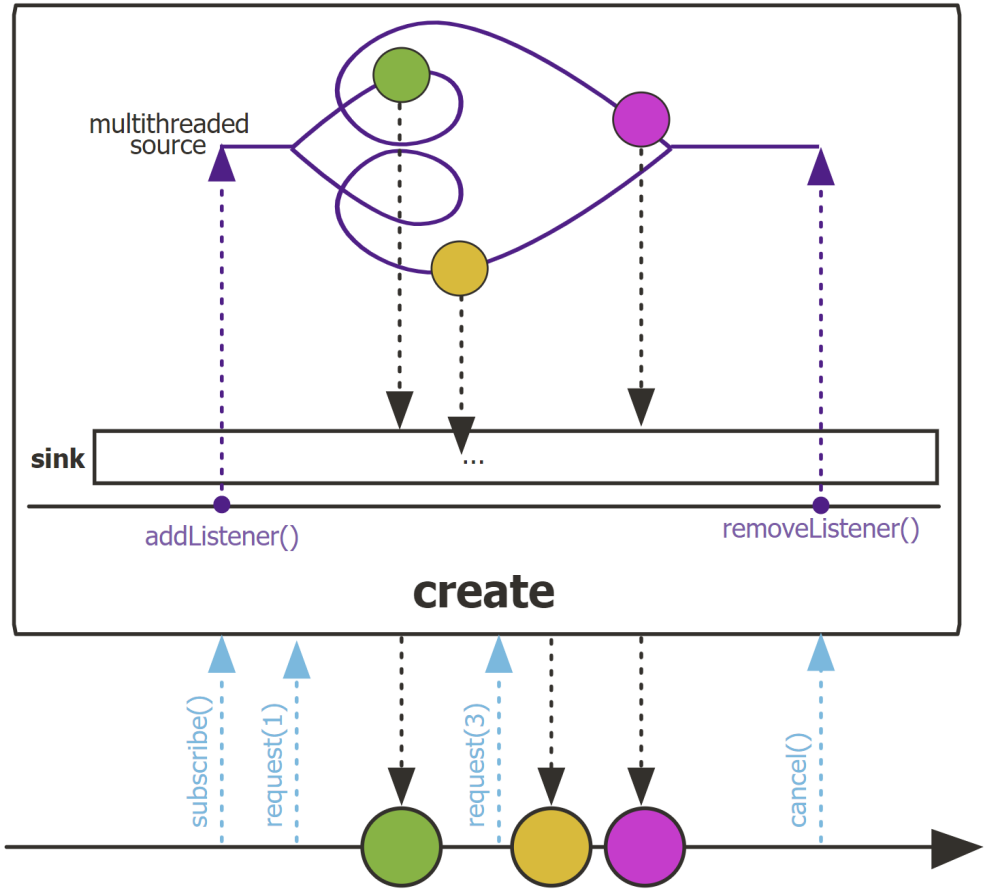

```
Flux
   .generate((SynchronousSink<BigFraction> sink) -> sink
             .next(BigFractionUtils
                   .makeBigFraction(sRANDOM,
                                    false)))
   .take(sMAX_FRACTIONS)
   ...
```

Can be used with take() to limit the number of elements generated

See earlier lesson on "*Key Suppressing Operators in the Flux Class*"

Key Factory Method Operators in the Flux Class

- The generate() operator
  - Create a Flux by generating signals 1-by-1 via a callback
  - It is only allowed to generate one event at a time, which supports backpressure
    - In contrast, create() simply produces events whenever it wishes to do so



See projectreactor.io/docs/core/release/api/reactor/core/publisher/Flux.html#create

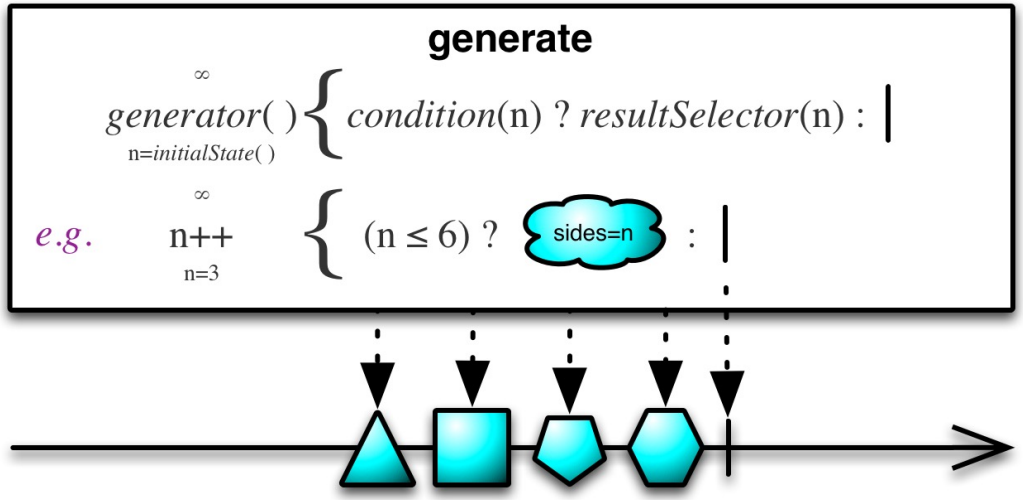
Key Factory Method Operators in the Flux Class

- The generate() operator
  - Create a Flux by generating signals 1-by-1 via a callback
  - It is only allowed to generate one event at a time, which supports backpressure
    - In contrast, create() simply produces events whenever it wishes to do so
      - i.e., it ignores backpressure

See www.wideopeneats.com/i-love-lucy-chocolate-factory

Key Factory Method Operators in the Flux Class

- The generate() operator
  - Create a Flux by generating signals 1-by-1 via a callback
  - It is only allowed to generate one event at a time, which supports backpressure
  - RxJava's Observable.generate() works in a similar way




```
Observable
   .generate((Emitter<BigFraction> emit) -> emit
                .onNext(BigFractionUtils
                   .makeBigFraction(sRANDOM,
                                    false))) ...
```

Generate a stream of random, large, & unreduced big fractions

See reactivex.io/RxJava/3.x/javadoc/io/reactivex/rxjava3/core/Observable.html#generate

Key Factory Method Operators in the Flux Class

- The generate() operator
  - Create a Flux by generating signals 1-by-1 via a callback
  - It is only allowed to generate one event at a time, which supports backpressure
  - RxJava's Observable.generate() works the same
  - Similar to Stream.generate() in Java Streams

generate

```
static <T> Stream<T> generate(Supplier<T> s)
```

Returns an infinite sequential unordered stream where each element is generated by the provided `Supplier`. This is suitable for generating constant streams, streams of random elements, etc.

Type Parameters:

`T - the type of stream elements`

Parameters:

`s - the Supplier of generated elements`

Returns:

`a new infinite sequential unordered Stream`

```
Stream
    .generate(() -> BigFractionUtils
                    .makeBigFraction(new Random(),
                                     false))
```

Generate a stream of random, large, & unreduced big fractions

See docs.oracle.com/javase/8/docs/api/java/util/stream/Stream.html#generate

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