Key Factory Method Operators in the Flowable Class (Part 2)

Douglas C. Schmidt
d.schmidt@vanderbilt.edu
www.dre.vanderbilt.edu/~schmidt

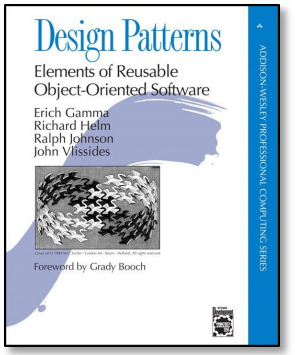
Professor of Computer Science

Institute for Software Integrated Systems

Vanderbilt University
Nashville, Tennessee, USA

Learning Objectives in this Part of the Lesson

- Recognize key operators defined in—or used with—Flowable
  - Factory method operators
    - These operators create Flowable streams in various ways
      - e.g., create() & generate()



See en.wikipedia.org/wiki/Factory_method_pattern

Key Factory Method Operators in the Flowable Class

Key Factory Method Operators in the Flowable Class

- The generate() operator

generate

```
@CheckReturnValue
 @NonNull
 @BackpressureSupport(value=FULL)
 @SchedulerSupport(value="none")
public static <T> @NonNull Flowable<T> generate(@NonNull Consumer<Emitter<T>> generator)
```

Returns a cold, synchronous, stateless and backpressure-aware generator of values.

Note that the `Emitter.onNext(T)`, `Emitter.onError(java.lang.Throwable)` and `Emitter.onComplete()` methods provided to the function via the `Emitter` instance should be called synchronously, never concurrently and only while the function body is executing. Calling them from multiple threads or outside the function call is not supported and leads to an undefined behavior.

Backpressure:
The operator honors downstream backpressure.

Scheduler:
`generate` does not operate by default on a particular `Scheduler`.

Type Parameters:
`T` - the generated value type

Parameters:
`generator` - the `Consumer` called whenever a particular downstream `Subscriber` has requested a value. The callback then should call `onNext`, `onError` or `onComplete` to signal a value or a terminal event. Signaling multiple `onNext` in a call will make the operator signal `IllegalStateException`.

Returns:
the new `Flowable` instance

Throws:
`NullPointerException` - if `generator` is `null`

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

Key Factory Method Operators in the Flowable Class

- The generate() operator
  - Returns a synchronous, stateless, & backpressure-aware generator of values

```
static <T> Flowable<T> generate
(Consumer<Emitter<T>> generator)
```

Flowable.generate() is quite different from Observable.generate()

Key Factory Method Operators in the Flowable Class

- The generate() operator
  - Returns a synchronous, stateless, & backpressure-aware generator of values
    - The param is called when a down-stream Subscriber requests a value

```
static <T> Flowable<T> generate
(Consumer<Emitter<T>> generator)
```

```
@FunctionalInterface
public interface Consumer<T>
```

A functional interface (callback) that accepts a single value.

Method Summary

All Methods	Instance Methods	Abstract Methods

Modifier and Type	Method and Description
void	`accept(T t)` Consume the given value.

See reactivex.io/RxJava/3.x/javadoc/io/reactivex/rxjava3/functions/Consumer.html

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See reactivex.io/RxJava/3.x/javadoc/io/reactivex/rxjava3/core/Emitter.html

Key Factory Method Operators in the Flowable Class

- The generate() operator
  - Returns a synchronous, stateless, & backpressure-aware generator of values
    - The param is called when a down-stream Subscriber requests a value
      - The Emitter should call onNext(), onError(), or onComplete() to signal a value or a terminal event
        - Only call these methods synchronously, never concurrently, & only while the method body is executing

```
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Key Factory Method Operators in the Flowable Class

- The generate() operator
  - Returns a synchronous, stateless, & backpressure-aware generator of values
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- The generate() operator
  - Returns a synchronous, stateless, & backpressure-aware generator of values
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      - This Flowable is "cold," which only emits items upon subscription

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static <T> Flowable<T> generate
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See medium.com/tompee/rxjava-ninja-hot-and-cold-observables-19b30d6cc2fa

Key Factory Method Operators in the Flowable Class

- The generate() operator
  - Returns a synchronous, stateless, & backpressure-aware generator of values
    - The param is called when a down-stream Subscriber requests a value
    - Returns a new Flowable instance
      - This Flowable is "cold," which only emits items upon subscription
      - Each Flowable has its own set of items emitted to it

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Key Factory Method Operators in the Flowable Class

- The generate() operator
  - Returns a synchronous, stateless, & backpressure-aware generator of values
  - The param is invoked to emit the given # of events when a Subscriber calls request() on a Subscription

```
void onNext() {
  ...
  mSubscription
    .request(mRequestSize);
  ...
}
```

```
Flowable
  .generate(emitter -> {
    if (sIntegersEmitted++
        < count))
      emitter.onNext(random
          .nextInt(maxValue));
    else
      emitter.onComplete();
  })
  ...
```

See github.com/douglascraigschmidt/LiveLessons/tree/master/Reactive/Flowable/ex2

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A Subscriber requests the next tranche of events

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A Publisher's Consumer Emitter is called back mRequestSize times or until it emits onComplete()

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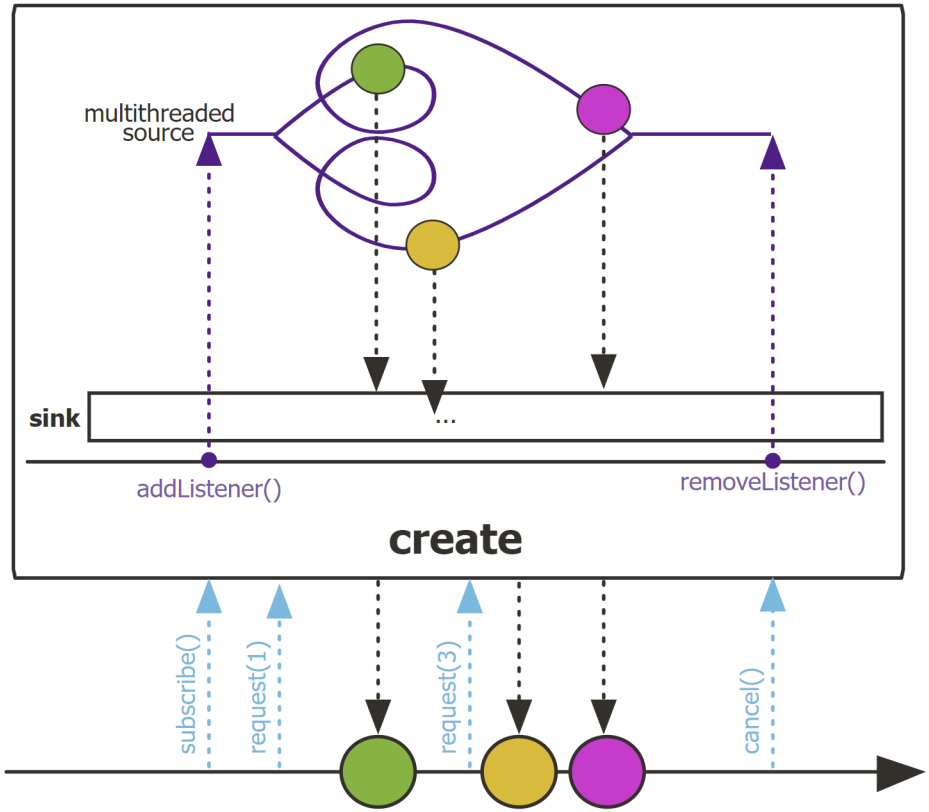
  - Project Reactor's Flux.create() operator works in a similar way



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

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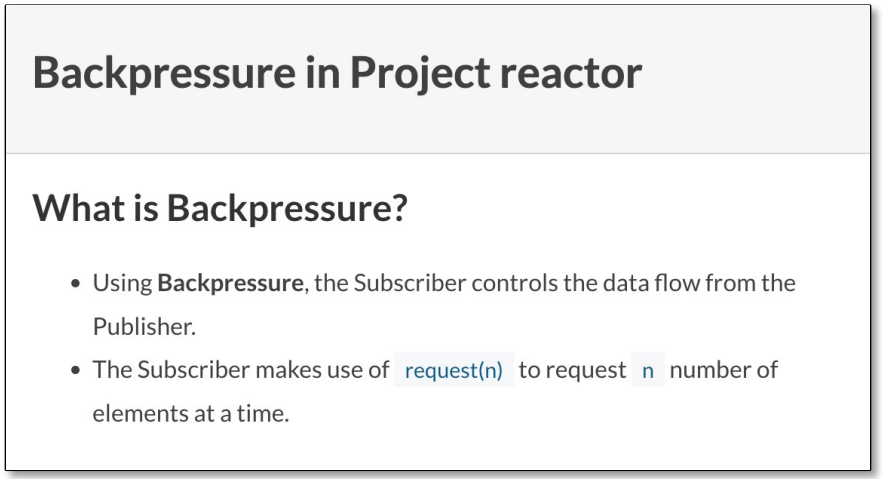
  - However, this operator supports both backpressure-aware publishers & backpressure strategies



See jstobigdata.com/java/backpressure-in-project-reactor

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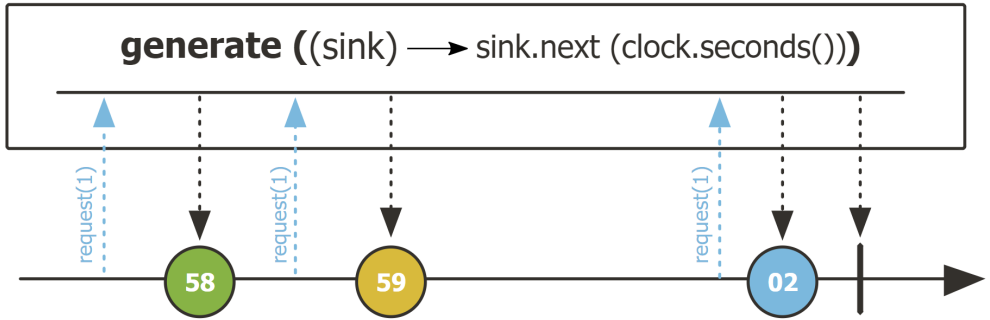

- Project Reactor's Flux.create() operator works in a similar way
  - However, this operator supports both backpressure-aware publishers & backpressure strategies
  - Flux.generator() is like Observable.generate() & lacks backpressure support

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

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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`

- Java Streams generate() method doesn't support backpressure

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

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- Java Streams generate() method doesn't support backpressure
  - However, it is a "pull-based" model rather than "push-based" pub/sub model, so backpressure support is not necessary

End of Key Factory Method Operators in the Flowable Class (Part 2)