

Overview of Popular Implementations of the Java Reactive Streams API

Douglas C. Schmidt

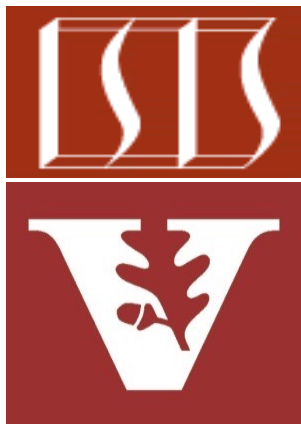
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Learning Objectives in this Part of the Lesson

- Understand the key benefits & principles underlying the reactive programming paradigm
- Know the Java reactive streams API & popular implementations of this API



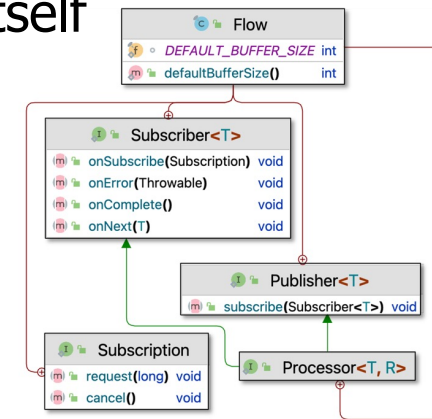
Project
Reactor

See www.baeldung.com/rx-java & projectreactor.io

Popular Implementations of Java Reactive Streams

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- The Java Flow API isn't very useful by itself



Useless
Things



Popular Implementations of Java Reactive Streams

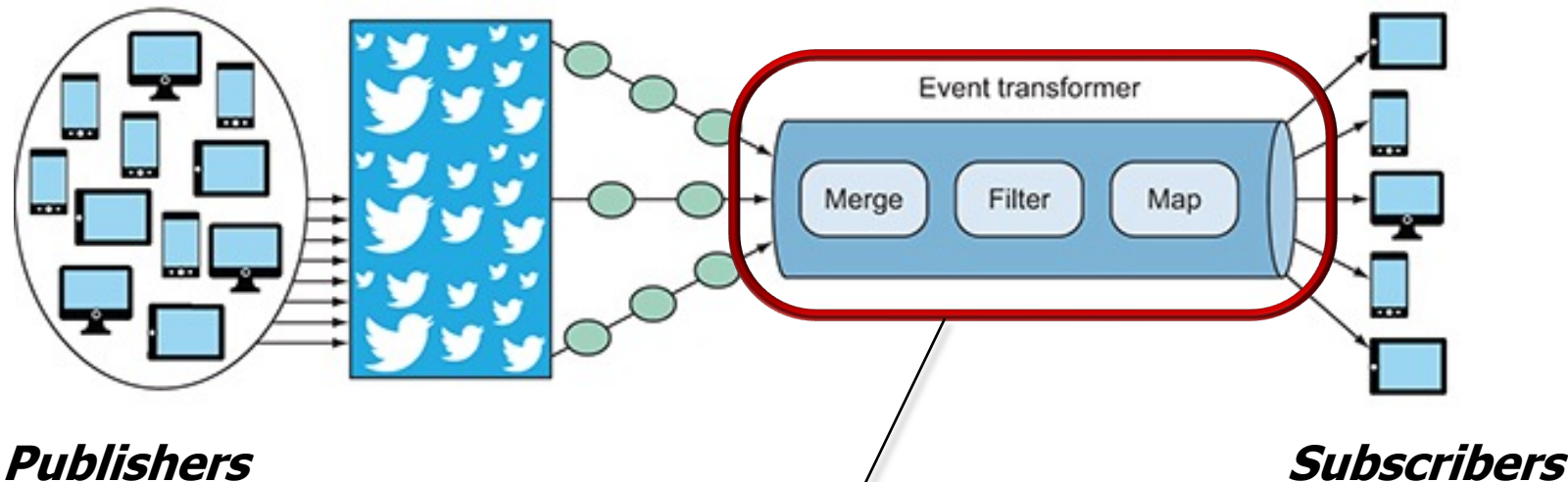
- The Java Flow API isn't very useful by itself
 - However, this API serves as an interoperable foundation implemented by other popular reactive programming frameworks



Project
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Popular Implementations of Java Reactive Streams

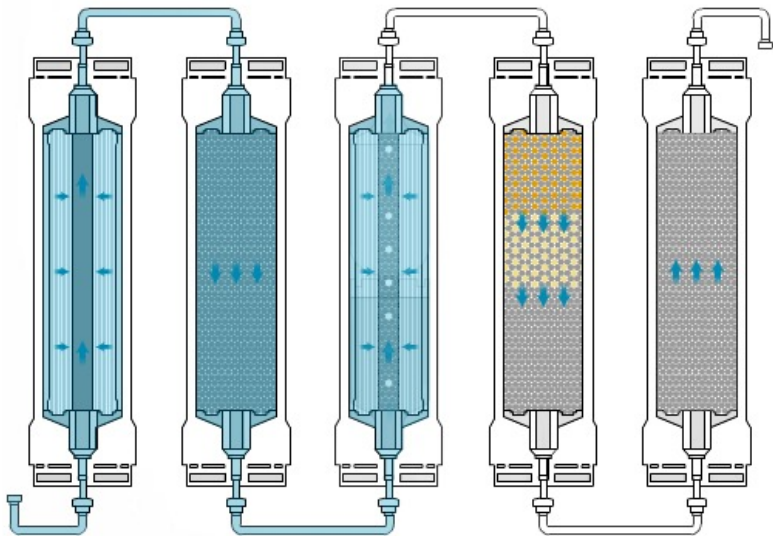
- Reactive streams implementations enable the insertion of event transformer operators between publishers & subscribers



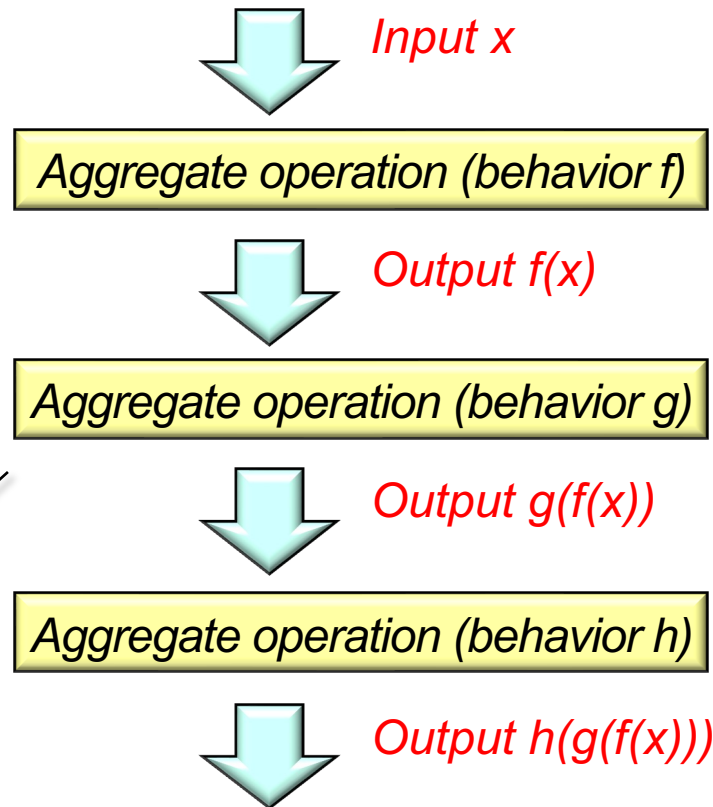
Data processed by a reactive app moves thru an "assembly line" (pipeline) of transformer operators

Popular Implementations of Java Reactive Streams

- Reactive streams implementations enable the insertion of event transformer operators between publishers & subscribers



Transformer operators are similar to aggregate operations in Java Streams



See docs.oracle.com/javase/tutorial/collections/streams

Popular Implementations of Java Reactive Streams

- Reactive streams programs rarely use Publisher, Subscriber, & Subscription interfaces directly, but instead use classes that implement those interfaces

RxJava	Reactor	Purpose
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See www.nurkiewicz.com/2019/02/rxjava-vs-reactor.html

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See github.com/ReactiveX/RxJava/wiki

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See projectreactor.io

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

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```
static Mono<Void> testFractionReductionSync () {  
    ...  
    return Mono  
        .fromCallable (reduceFraction)  
        .map (convertToMixedString)  
        .doOnSuccess (printResult)  
        .then (); ...  
}
```

See github.com/douglasraigschmidt/LiveLessons/tree/master/Reactive/mono

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

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RxJava	Reactor	Purpose
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```
static <T> Flux<T> generate(Supplier<T> supplier,  
                           long count) {  
    return Flux  
        .create(sink -> {  
            LongStream.rangeClosed(1, count)  
                .forEach(i -> sink.next(supplier.get()));  
            sink.complete(); }); ...  
}
```

Flowable<T>	Flux<T>	Emits an indefinite number of events (zero to infinite), optionally completes successfully or with failure. Supports backpressure (the source can be slowed down when the consumer cannot keep up)
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See reactivex.io/RxJava/3.x/javadoc/io/reactivex/rxjava3/core/Single.html

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```
static Completable testFractionMultiplicationCallable2 () { ...
    return Single
        .fromCallable (call)
        .subscribeOn (Schedulers .single ())
        .doOnSuccess (bigFraction -> printResult (bigFraction, sb));
```

See github.com/douglas-craig-schmidt/LiveLessons/tree/master/Reactive/Single

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RxJava	Reactor	Purpose
<pre>Observable.range(1, sMAX_FRACTIONS) .subscribe(__ -> emitter .onNext(makeBigFraction(sRANDOM, false)), t -> emitter.onComplete(), emitter::onComplete);</pre>		
Observable<T>	N/A	Emits an indefinite number of events (zero to infinite), optionally completes successfully or with failure. Does not support back-pressure due to the nature of the source of events it represents.
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```
Flowable<Double> rateF = Flowable
    .just("GBP:USA")
    .parallel()
    .runOn(Schedulers.from(ForkJoinPool.commonPool()))
    .map(this::queryExchangeRateFor)
    .sequential()
    .timeout(2, TimeUnit.SECONDS, sDEFAULT_RATE_F);
```

[Flowable<T>](#)

[Flux<T>](#)

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End of Overview of Popular Implementations of the Java Reactive Streams API