Overview of Popular Implementations of the Java Reactive Streams API

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Learning Objectives in this Part of the Lesson

- Understand the key benefits & principles underlying the reactive programming paradigm

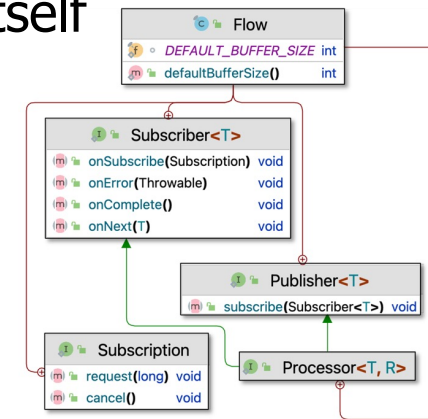- Know the Java reactive streams API & popular implementations of this API

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

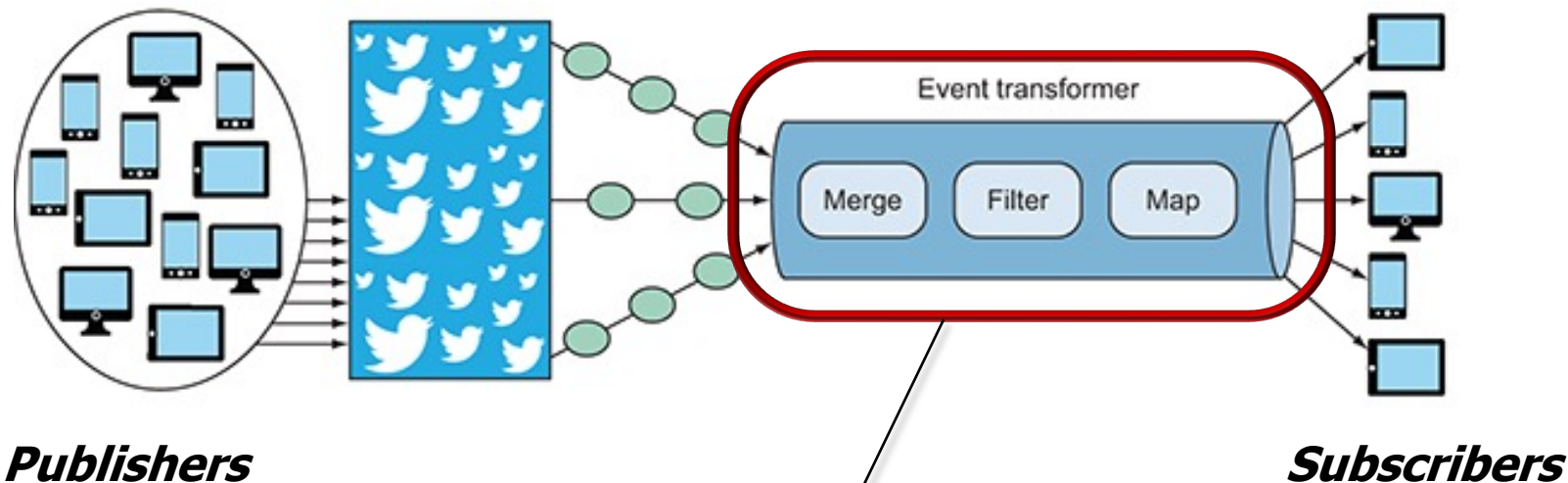# Popular Implementations of Java Reactive Streams

- 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

See github.com/ReactiveX/RxJava/wiki & projectreactor.io

Popular Implementations of Java Reactive Streams

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

Publishers

Event transformer

Merge   Filter   Map

Subscribers

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

See projectreactor.io/docs/core/milestone/reference/#_from_imperative_to_reactive_programming

Popular Implementations of Java Reactive Streams

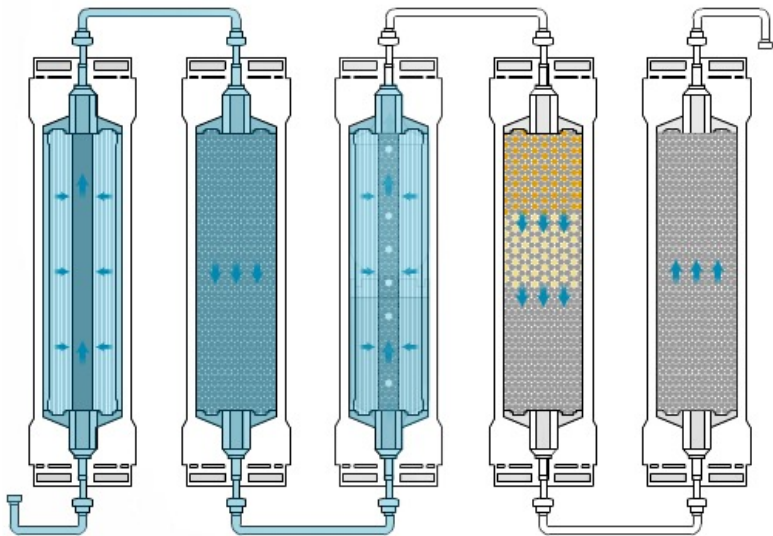- Reactive streams implementations enable the insertion of event transformer operators between publishers & subscribers
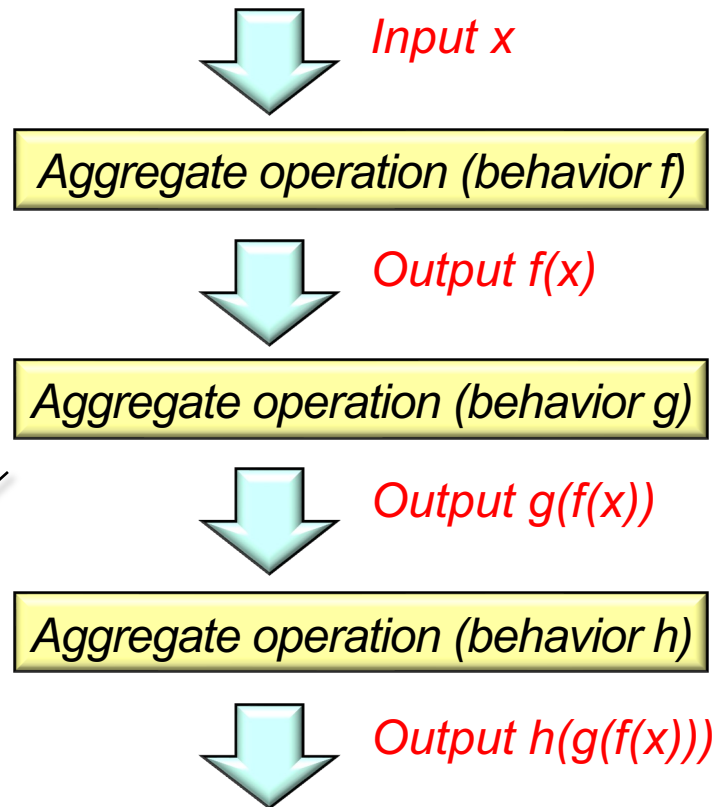
Input x

Aggregate operation (behavior f)

Output f(x)

Aggregate operation (behavior g)

Output g(f(x))

Aggregate operation (behavior h)

Output h(g(f(x)))

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 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/douglascraigschmidt/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

```
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)

See github.com/douglascraigschmidt/LiveLessons/tree/master/Reactive/flux

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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));
```

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RxJava	Reactor	Purpose
Observable.range(1, sMAX_FRACTIONS) .subscribe(__ -> emitter .onNext(makeBigFraction(sRANDOM, false)), t -> emitter.onComplete(), emitter::onComplete);		
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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RxJava	Reactor	Purpose

```
Flowable<Double> rateF = Flowable
    .just("GBP:USA")
    .parallel()
    .runOn(Schedulers.from(ForkJoinPool.commonPool()))
    .map(this::queryExchangeRateFor)
    .sequential()
    .timeout(2, TimeUnit.SECONDS, sDEFAULT_RATE_F);
```

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