Key Terminal Operators in the Flux Class

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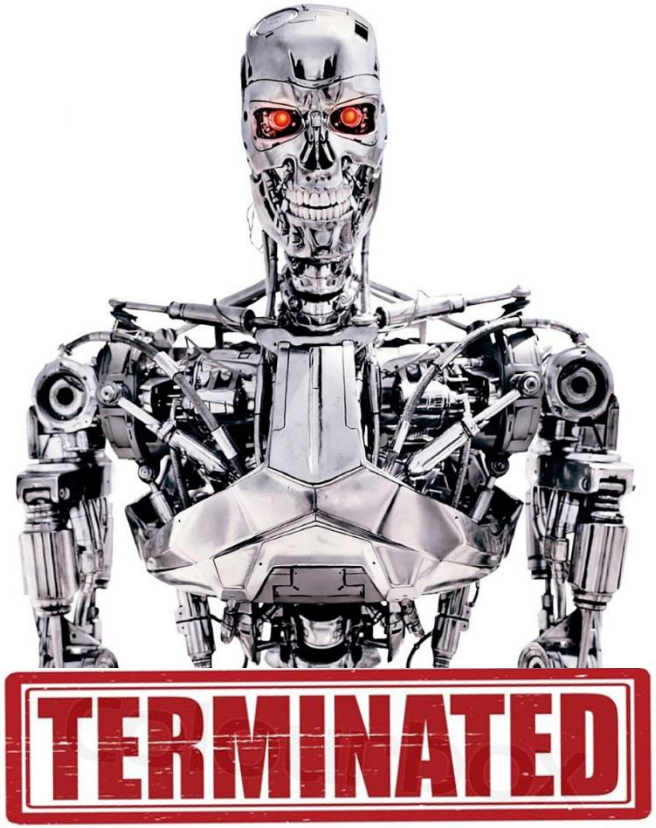
Learning Objectives in this Part of the Lesson

- Recognize key Flux operators
  - Factory method operators
  - Transforming operators
  - Action operators
  - Combining operators
  - Terminal operators
    - Terminate a Flux stream & trigger all the processing of operators in the stream
      - e.g., subscribe()



Key Terminal Operators in the Flux Class

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- The subscribe() operator
  - Subscribe a Consumer to this Flux

```
Disposable subscribe
   (Consumer<? super T> consumer,
    Consumer<? super Throwable>
      errorConsumer,
    Runnable completeConsumer)
```

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

Key Terminal Operators in the Flux Class

- The subscribe() operator
  - Subscribe a Consumer to this Flux
    - This operator consumes all elements in the sequence, handles errors, & reacts to completion

```
Disposable subscribe
   (Consumer<? super T> consumer,
    Consumer<? super Throwable>
      errorConsumer,
    Runnable completeConsumer)
```

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 Terminal Operators in the Flux Class

- The subscribe() operator
  - Subscribe a Consumer to this Flux
    - This operator consumes all elements in the sequence, handles errors, & reacts to completion
      - This subscription requests unbounded demand
        - i.e., Long.MAX_VALUE

```
Disposable subscribe
   (Consumer<? super T> consumer,
    Consumer<? super Throwable>
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```

Key Terminal Operators in the Flux Class

- The subscribe() operator
  - Subscribe a Consumer to this Flux
    - This operator consumes all elements in the sequence, handles errors, & reacts to completion
      - This subscription requests unbounded demand
    - Signals emitted to this method are represented by the following regular expression:

      `onNext()*(onComplete()|onError())`

```
public final Disposable subscribe(@Nullable
                                  Consumer<? super T> consumer,
                                  @Nullable
                                  Consumer<? super Throwable> errorConsumer,
                                  @Nullable
                                  Runnable completeConsumer)
```

Subscribe `Consumer` to this `Flux` that will respectively consume all the elements in the sequence, handle errors and react to completion. The subscription will request unbounded demand (`Long.MAX_VALUE`).

For a passive version that observe and forward incoming data see `doOnNext(java.util.function.Consumer)`, `doOnError(java.util.function.Consumer)` and `doOnComplete(Runnable)`.

For a version that gives you more control over backpressure and the request, see `subscribe(Subscriber)` with a `BaseSubscriber`.

Keep in mind that since the sequence can be asynchronous, this will immediately return control to the calling thread. This can give the impression the consumer is not invoked when executing in a main thread or a unit test for instance.

Key Terminal Operators in the Flux Class

- The subscribe() operator
  - Subscribe a Consumer to this Flux
    - This operator consumes all elements in the sequence, handles errors, & reacts to completion
  - A Disposable is returned, which indicates a task or resource that can be cancelled/disposed

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Disposable subscribe
  (Consumer<? super T> consumer,
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     errorConsumer,
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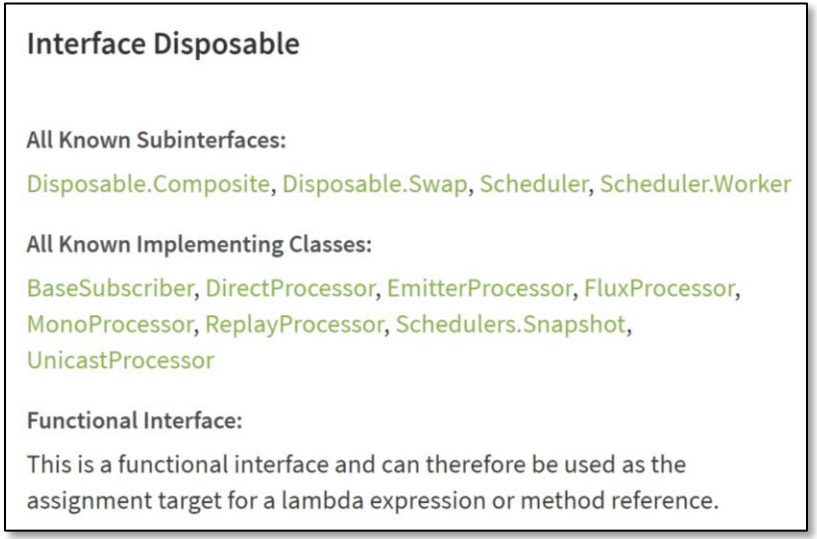

Interface Disposable

All Known Subinterfaces:

Disposable.Composite, Disposable.Swap, Scheduler, Scheduler.Worker

All Known Implementing Classes:

BaseSubscriber, DirectProcessor, EmitterProcessor, FluxProcessor, MonoProcessor, ReplayProcessor, Schedulers.Snapshot, UnicastProcessor

Functional Interface:

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See projectreactor.io/docs/core/release/api/reactor/core/Disposable.html

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- The subscribe() operator
  - Subscribe a Consumer to this Flux
    - This operator consumes all elements in the sequence, handles errors, & reacts to completion
  - A Disposable is returned, which indicates a task or resource that can be cancelled/disposed
    - Disposables can be accumulated & disposed in one fell swoop!

```
Disposable.Composite
  mDisposables;


...

mDisposables =
  Disposables.composite
    (mPublisherScheduler,
     mSubscriberScheduler,
     mSubscriber);

...


mDisposables.dispose();
```

See projectreactor.io/docs/core/release/api/reactor/core/Disposable.Composite.html

Key Terminal Operators in the Flux Class

- The subscribe() operator
  - Subscribe a Consumer to this Flux
  - This operator triggers all the processing in a chain

```
Flux
   .fromIterable
     (bigFractionList)
   .map(fraction -> fraction
      .multiply(sBigReducedFraction))
   .subscribe(fraction -> sb
                .append(" = "
                + fraction
                   .toMixedString()
                + "\n"),
                error -> { sb
                   .append("error"); ...
                },
                () -> BigFractionUtils
              .display(sb.toString()));
```

Initiate processing & handle outputs

See Reactive/flux/ex1/src/main/java/FluxEx.java

Key Terminal Operators in the Flux Class

- The subscribe() operator
  - Subscribe a Consumer to this Flux
  - This operator triggers all the processing in a chain

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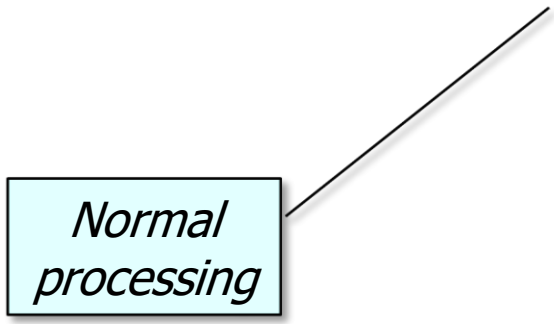

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                () -> BigFractionUtils
              .display(sb.toString()));
```

Error Processing

Key Terminal Operators in the Flux Class

- The subscribe() operator
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Flux
   .fromIterable
     (bigFractionList)
   .map(fraction -> fraction
      .multiply(sBigReducedFraction))
   .subscribe(fraction -> sb
                .append(" = "
                + fraction
                   .toMixedString()
                + "\n"),
                error -> { sb
                   .append("error"); ...
                },
                () -> BigFractionUtils
             .display(sb.toString()));
```
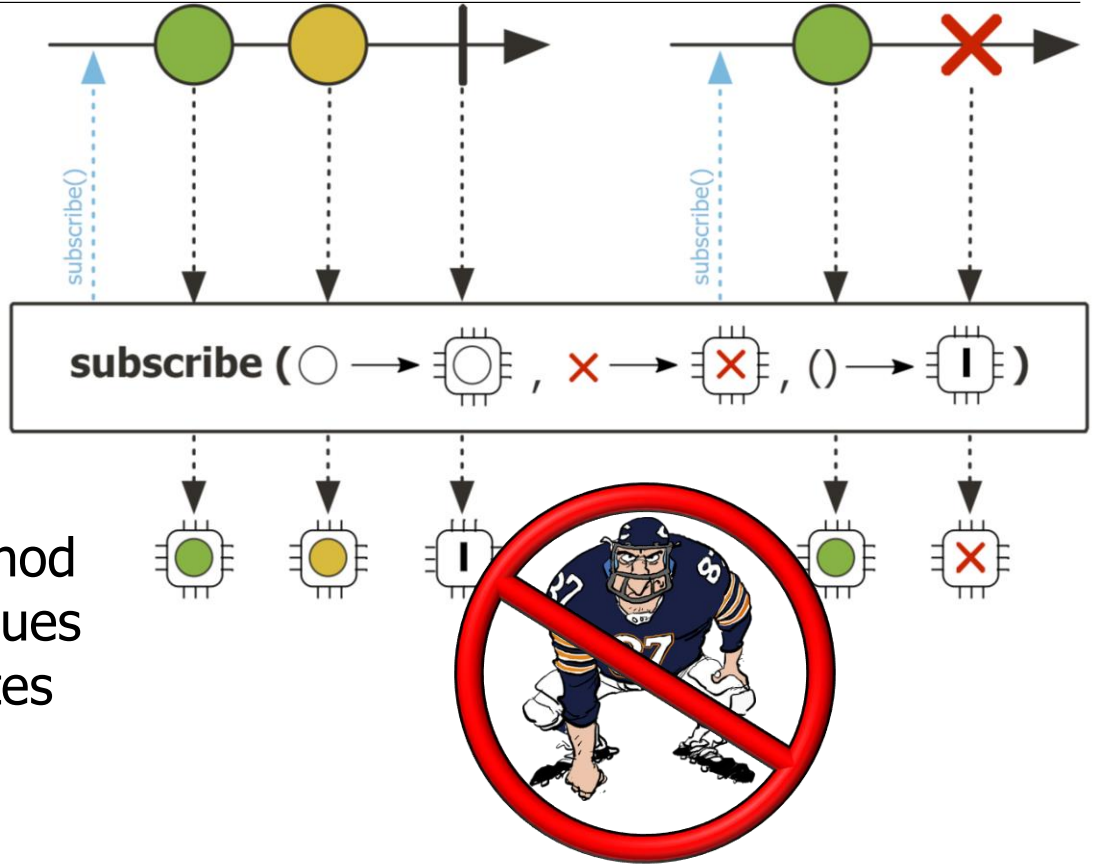

Completion Processing

Key Terminal Operators in the Flux Class

- The subscribe() operator
  - Subscribe a Consumer to this Flux
  - This operator triggers all the processing in a chain
  - Calling this method will *not* block the caller thread
    - For async streams this method returns & processing continues until the upstream terminates normally or with an error



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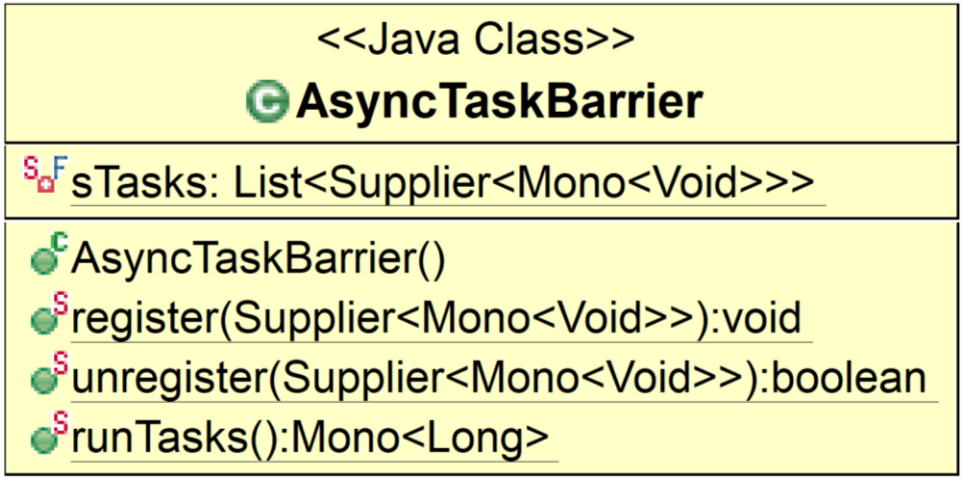

- These semantics motivate the need for the AsyncTaskBarrier framework!

See Reactive/mono/ex1/src/main/java/utils/AsyncTaskBarrier.java

Key Terminal Operators in the Flux Class

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  - Subscribe a Consumer to this Flux
  - This operator triggers all the processing in a chain
  - Calling this method will *not* block the caller thread
  - Other versions of subscribe() support different capabilities

```
Disposable subscribe
   (Consumer<? super T> consumer,
    Consumer<? super Throwable>
      errorConsumer,
    Runnable completeConsumer,
    Consumer<? super Subscription>
      subscriptionConsumer)
```

Pass a custom Consumer called on initial subscribe() signal that can apply backpressure & other features

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

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- The subscribe() operator
  - Subscribe a Consumer to this Flux
  - This operator triggers all the processing in a chain
  - Calling this method will *not* block the caller thread
  - Other versions of subscribe() support different capabilities
  - RxJava's Observable.subscribe() works the same

subscribe

```
@CheckReturnValue
 @SchedulerSupport(value="none")
 @NonNull
public final @NonNull Disposable subscribe(@NonNull @NonNull Consumer<? super T> onNext,
        @NonNull @NonNull Consumer<? super Throwable> onError,
        @NonNull @NonNull Action onComplete)
```

Subscribes to the current `Observable` and provides callbacks to handle the items it emits and any error or completion notification it signals.

Scheduler:

`subscribe` does not operate by default on a particular `Scheduler`.

Parameters:

`onNext` - the `Consumer<T>` you have designed to accept emissions from the current `Observable`
`onError` - the `Consumer<Throwable>` you have designed to accept any error notification from the current `Observable`
`onComplete` - the `Action` you have designed to accept a completion notification from the current `Observable`

Returns:

the new `Disposable` instance that can be used to dispose the subscription at any time

Throws:

`NullPointerException` - if `onNext`, `onError` or `onComplete` is `null`

See Also:

ReactiveX operators documentation: Subscribe

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

End of Key Terminal Operators in the Flux Class