



免費電子書

學習

rx-java

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#rx-java

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1: rx-java

rx-java。

RxJava Reactive Extensions Java VM。

Wiki Home RxJava。

| | | |
|-----|-------|---------|
| 1.x | 1.3.0 | 201755 |
| 2.X | 2.1.1 | 2017621 |

Examples

rx-java

1. `compile 'io.reactivex:rxjava2:rxjava:2.1.1'`

2. Maven

```
<dependency>
    <groupId>io.reactivex.rxjava2</groupId>
    <artifactId>rxjava</artifactId>
    <version>2.1.1</version>
</dependency>
```

3. `<dependency org="io.reactivex.rxjava2" name="rxjava" rev="2.1.1" />`

4. JFrog

```
repositories {
maven { url 'https://oss.jfrog.org/libs-snapshot' }
}

dependencies {
    compile 'io.reactivex:rxjava:2.0.0-SNAPSHOT'
}
```

5. jar Maven pom

```
<?xml version="1.0"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <groupId>com.netflix.rxjava.download</groupId>
```

```

<artifactId>rxjava-download</artifactId>
<version>1.0-SNAPSHOT</version>
<name>Simple POM to download rxjava and dependencies</name>
<url>http://github.com/ReactiveX/RxJava</url>
<dependencies>
    <dependency>
        <groupId>io.reactivex</groupId>
        <artifactId>rxjava</artifactId>
        <version>2.0.0</version>
        <scope/>
    </dependency>
</dependencies>
</project>

```

```
$ mvn -f download-rxjava-pom.xml dependency:copy-dependencies
```

```
rxjava-*.jar./target/dependency/.
```

Java 6.

Hello, World!

```

public void hello() {
    Observable.just("Hello, World!") // create new observable
        .subscribe(new Action1<String>() { // subscribe and perform action

            @Override
            public void call(String st) {
                System.out.println(st);
            }
        });
}

```

Java 8 lambda

```

public void hello() {
    Observable.just("Hello, World!") // create new observable
        .subscribe(onNext -> { // subscribe and perform action
            System.out.println(onNext);
        });
}

```

RxJava

RxJava Observables Subscribers ◦ Observable Subscriber ◦

Observable ◦ **Observables** ◦ observable ◦ Observable Observable ◦

```

Observable<Integer> integerObservable = Observable.just(1, 2, 3); // Integer observable
Observable<String> stringObservable = Observable.just("Hello, ", "World", "!");

```

integerObservable stringObservable just **RX** ◦ Observable ◦

Subscriber。 Subscriber **observable**。 ObservableSubscriberonNext() onCompleted() onError()。

```
Subscriber<Integer> mSubscriber = new Subscriber<Integer>() {
    // NOTE THAT ALL THESE ARE CALLED BY THE OBSERVABLE
    @Override
    public void onCompleted() {
        // called when all objects are emitted
        System.out.println("onCompleted called!");
    }

    @Override
    public void onError(Throwable throwable) {
        // called when an error occurs during emitting objects
        System.out.println("onError called!");
    }

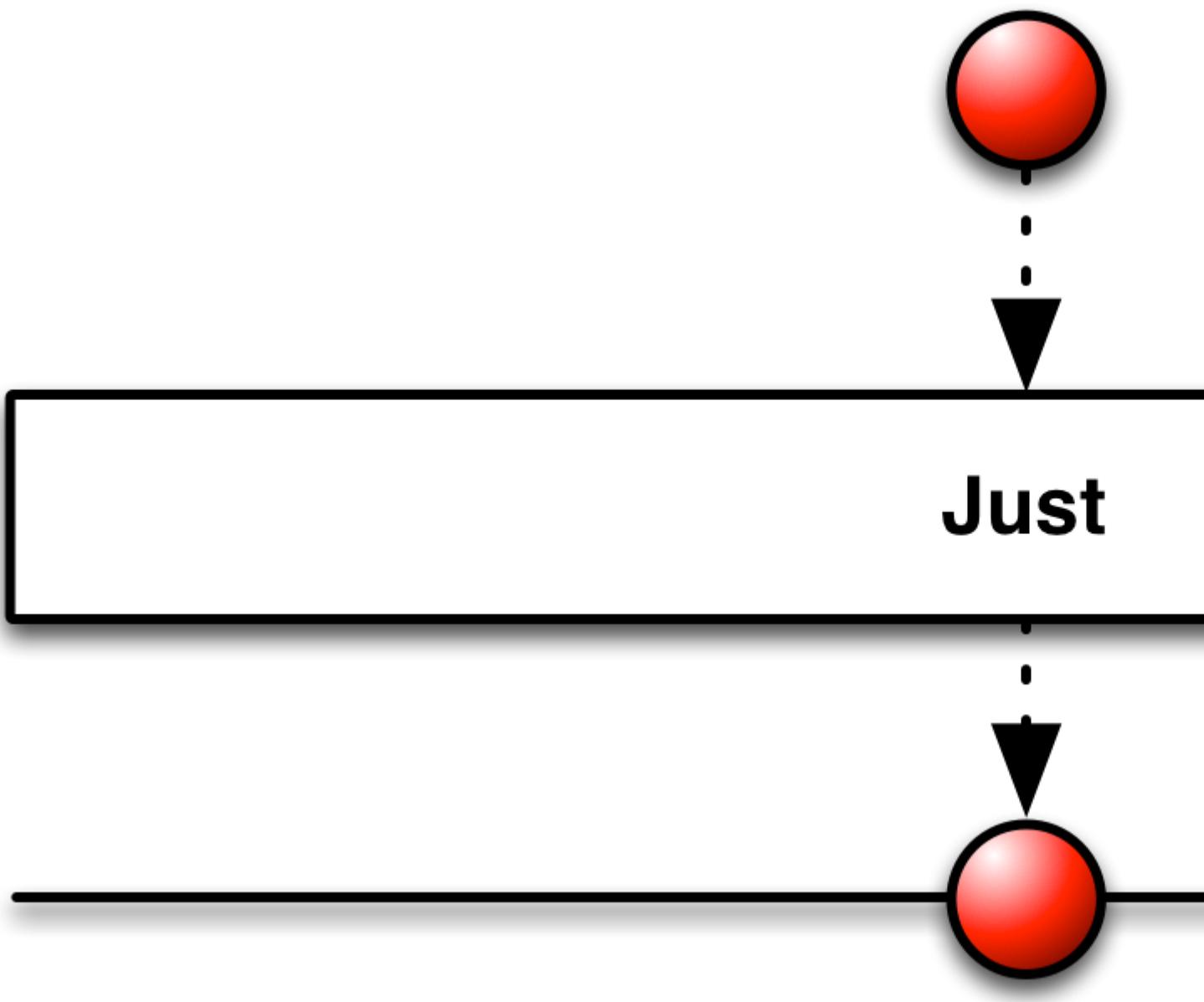
    @Override
    public void onNext(Integer integer) {
        // called for each object that is emitted
        System.out.println("onNext called with: " + integer);
    }
};
```

Subscriber。 Subscriber**observable**subscribesubscribe **observable**。

```
integerObservable.subscribe(mSubscriber);
```

```
onNext called with: 1
onNext called with: 2
onNext called with: 3
onCompleted called!
```

Observable。 ObservableonNextonCompleteonError。 observableonNext。 Observable
onComplete。 ObservableonError。 Rx。 Observable“Just”。



X。 “Just”onNextonComplete。 “Just”。 [ReativeX](#)[ReactiveX](#)[RxJava](#)。 [RxMarbles](#)。

[rx-java](#) <https://riptutorial.com/zh-TW/rx-java/topic/974/rx-java>

2: AndroidRxJava

RxAndroid。0.25.01.x。

1.0。

Examples

RxAndroid - AndroidSchedulers

AndroidRxJava。

gradleRxJavaRxAndroid

```
// use the last version
compile 'io.reactivex.rxjava2:rxjava:2.1.1'
compile 'io.reactivex.rxjava2:rxandroid:2.0.1'
```

RxAndroidRxJavaAndroidUI。

```
Observable.just("one", "two", "three", "four", "five")
    .subscribeOn(Schedulers.newThread())
    .observeOn(AndroidSchedulers.mainThread())
    .subscribe(
        data -> doStuffOnMainThread(),
        error -> handleErrorOnMainThread()
    )
```

Looper

```
Looper backgroundLooper = // ...
Observable.just("one", "two", "three", "four", "five")
    .subscribeOn(Schedulers.newThread())
    .observeOn(AndroidSchedulers.from(backgroundLooper))
    .subscribe(
        data -> doStuffOnMainThread(),
        error -> handleErrorOnMainThread()
    )
```

RxJava。

RxLifecycle

RxLifecycleAndroid。

Observable/。

```
// use the last version available
compile 'com.trello:rxlifecycle:0.6.1'
```

```
compile 'com.trello:rxlifecycle-components:0.6.1'
```

Rx*

- RxActivity / support.RxFragmentActivity / support.RxAppCompatActivity
- RxFragment / support.RxFragment
- RxDialogFragment / support.RxDialogFragment
- support.RxAppCompatDialogActivity

Observable

```
someObservable
    .compose(bindToLifecycle())
    .subscribe();
```

onCreate() onDestroy() ◦

- onStart() -> onStop()
- onResume() -> onPause()
- onAttach() -> onDetach()
- onViewCreated() -> onDestroyView()

```
someObservable
    .compose(bindUntilEvent(ActivityEvent.DESTROY))
    .subscribe();
```

```
someObservable
    .compose(bindUntilEvent(FragmentEvent.DESTROY_VIEW))
    .subscribe();
```

lifecycle() lifecycle()◦

RxLifecycle

```
.compose(RxLifecycleAndroid.bindActivity(lifecycle))
```

SingleCompletable bind forSingle() forCompletable

```
someSingle
    .compose(bindToLifecycle().forSingle())
    .subscribe();
```

Navi◦

Rxpermissions

RxJavaAndroid M◦

Rxjava

```
dependencies {
    compile 'com.tbruyelle.rxpermissions:rxpermissions:0.8.0@aar'
}
```

Rxjava2

```
dependencies {
    compile 'com.tbruyelle.rxpermissions2:rxpermissions:0.8.1@aar'
}
```

Retrolambda

```
// Must be done during an initialization phase like onCreate
RxPermissions.getInstance(this)
    .request(Manifest.permission.CAMERA)
    .subscribe(granted -> {
        if (granted) { // Always true pre-M
            // I can control the camera now
        } else {
            // Oups permission denied
        }
    });
});
```

<https://github.com/tbruyelle/RxPermissions>。

AndroidRxJava <https://riptutorial.com/zh-TW/rx-java/topic/7125/androidrxjava>

3: RxJava2 FlowableSubscriber

rxjava2FlowableSubscriber

rxjava2maven

```
<dependency>
    <groupId>io.reactivex.rxjava2</groupId>
    <artifactId>rxjava</artifactId>
    <version>2.0.8</version>
</dependency>
```

Examples

```
TestProducerIntegerSubscriber o Flowable<Integer>o Subscriptionrequest(long) Integero
```

```
subscriberSubscription onNext () onNext () request ()o outStandingRequestsisProducingo
```

```
class TestProducer extends Flowable<Integer> {
    static final Logger logger = LoggerFactory.getLogger(TestProducer.class);
    final int from, to;

    public TestProducer(int from, int to) {
        this.from = from;
        this.to = to;
    }

    @Override
    protected void subscribeActual(Subscriber<? super Integer> subscriber) {
        subscriber.onSubscribe(new Subscription() {

            /** the next value. */
            public int next = from;
            /** cancellation flag. */
            private volatile boolean cancelled = false;
            private volatile boolean isProducing = false;
            private AtomicLong outStandingRequests = new AtomicLong(0);

            @Override
            public void request(long n) {
                if (!cancelled) {

                    outStandingRequests.addAndGet(n);

                    // check if already fulfilling request to prevent call between request()
                    an subscriber.onNext()
                        if (isProducing) {
                            return;
                        }

                    // start producing
                    isProducing = true;

                    while (outStandingRequests.get() > 0) {

```

```

        if (next > to) {
            logger.info("producer finished");
            subscriber.onComplete();
            break;
        }
        subscriber.onNext(next++);
        outStandingRequests.decrementAndGet();
    }
    isProducing = false;
}
}

@Override
public void cancel() {
    cancelled = true;
}
);
}
}

```

ConsumerDefaultSubscriber<Integer> Integer。

```

class TestConsumer extends DefaultSubscriber<Integer> {

    private static final Logger logger = LoggerFactory.getLogger(TestConsumer.class);

    @Override
    protected void onStart() {
        request(1);
    }

    @Override
    public void onNext(Integer i) {
        logger.info("consuming {}", i);
        if (0 == (i % 5)) {
            try {
                Thread.sleep(500);
            } catch (InterruptedException ignored) {
                // can be ignored, just used for pausing
            }
        }
        request(1);
    }

    @Override
    public void onError(Throwable throwable) {
        logger.error("error received", throwable);
    }

    @Override
    public void onComplete() {
        logger.info("consumer finished");
    }
}

```

```

public static void main(String[] args) {
    try {
        final TestProducer testProducer = new TestProducer(1, 1_000);
        final TestConsumer testConsumer = new TestConsumer();
    }
}

```

```
    testProducer
        .subscribeOn(Schedulers.computation())
        .observeOn(Schedulers.single())
        .blockingSubscribe(testConsumer);

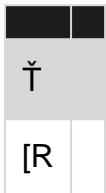
    } catch (Throwable t) {
        t.printStackTrace();
    }
}
```

rxjava2Flowable。

RxJava2 FlowableSubscriber <https://riptutorial.com/zh-TW/rx-java/topic/9810/rxjava2-flowable-subscriber>

4:

- Subject <TR> subject = AsyncSubject.create; //AsyncSubject
 - Subject <TR> subject = BehaviorSubject.create; //BehaviorSubject
 - Subject <TR> subject = PublishSubject.create; //PublishSubject
 - Subject <TR> subject = ReplaySubject.create; //ReplaySubject
 - mySafeSubject = new SerializedSubject; //unsafeSubjectsafeSubject -



Subject. .

Examples

RxJava Subject Observable Observer 。 Observable Observer Observable

```
Subject<String, String> subject = PublishSubject.create();
subject.subscribe(System.out::print);
subject.onNext("Hello, World!");
```

“HelloWorld” Subjects.

1. PublishSubject Subject

```
Subject<String, String> subject = PublishSubject.create();  
| | | | |  
subject<input, output> name = default publish subject
```

2 Observers

```
subject.subscribe(System.out::println);
```

Subject.

3 onNext Observables

```
subject.onNext("Hello, World!");
```

Subject.

Subject RxJava

- AsyncSubject

- BehaviorSubject
- PublishSubject
- ReplaySubject

SubjectSerializedSubject。 Subject ***Observable Contract***

- Dave Sexton

PublishSubject

PublishSubjectObserverObservable。

PublishSubject

```
Observable<Long> clock = Observable.interval(500, TimeUnit.MILLISECONDS);
Subject<Long, Long> subjectLong = PublishSubject.create();

clock.subscribe(subjectLong);

System.out.println("sub1 subscribing...");
subjectLong.subscribe(l -> System.out.println("sub1 -> " + l));
Thread.sleep(3000);
System.out.println("sub2 subscribing...");
subjectLong.subscribe(l -> System.out.println("sub2 -> " + l));
Thread.sleep(5000);
```

```
sub1 subscribing...
sub1 -> 0
sub1 -> 1
sub2 subscribing...
sub1 -> 2
sub2 -> 2
sub1 -> 3
sub2 -> 3
```

PublishSubjectObservable **500Long**。 PublishSubject clock sub1sub2。

PublishSubject**unsubscribe**。

```
createClock(); // 3 lines moved for brevity. same as above example

Thread.sleep(5000); // introduces a delay before first subscribe

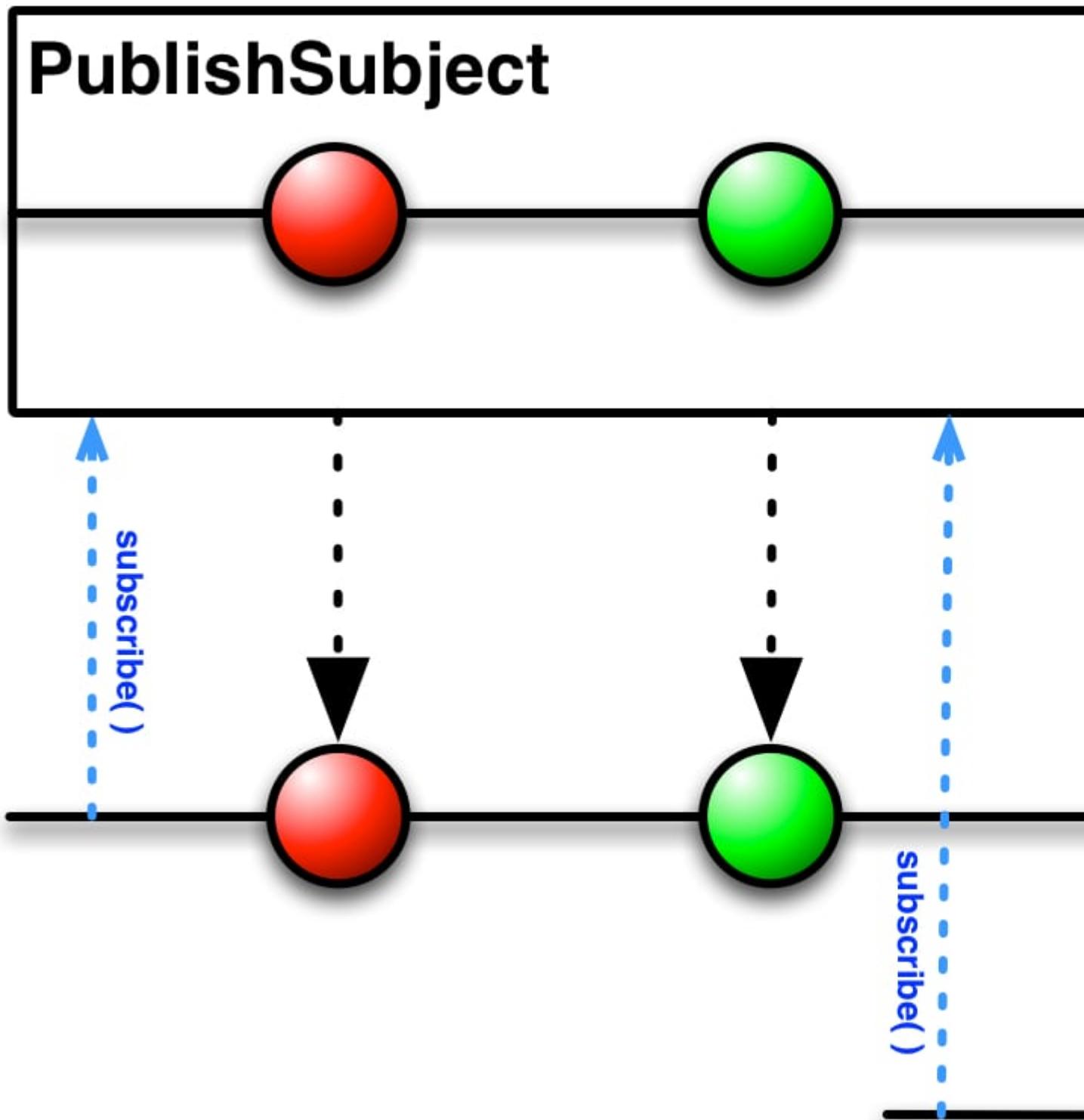
sub1andsub2(); // 6 lines moved for brevity. same as above example
```

```
sub1 subscribing...
sub1 -> 10
sub1 -> 11
sub2 subscribing...
sub1 -> 12
sub2 -> 12
sub1 -> 13
sub2 -> 13
```

```
sub110◦ 5◦ ◦ PublishSubjectHot Observable PublishSubject◦
```

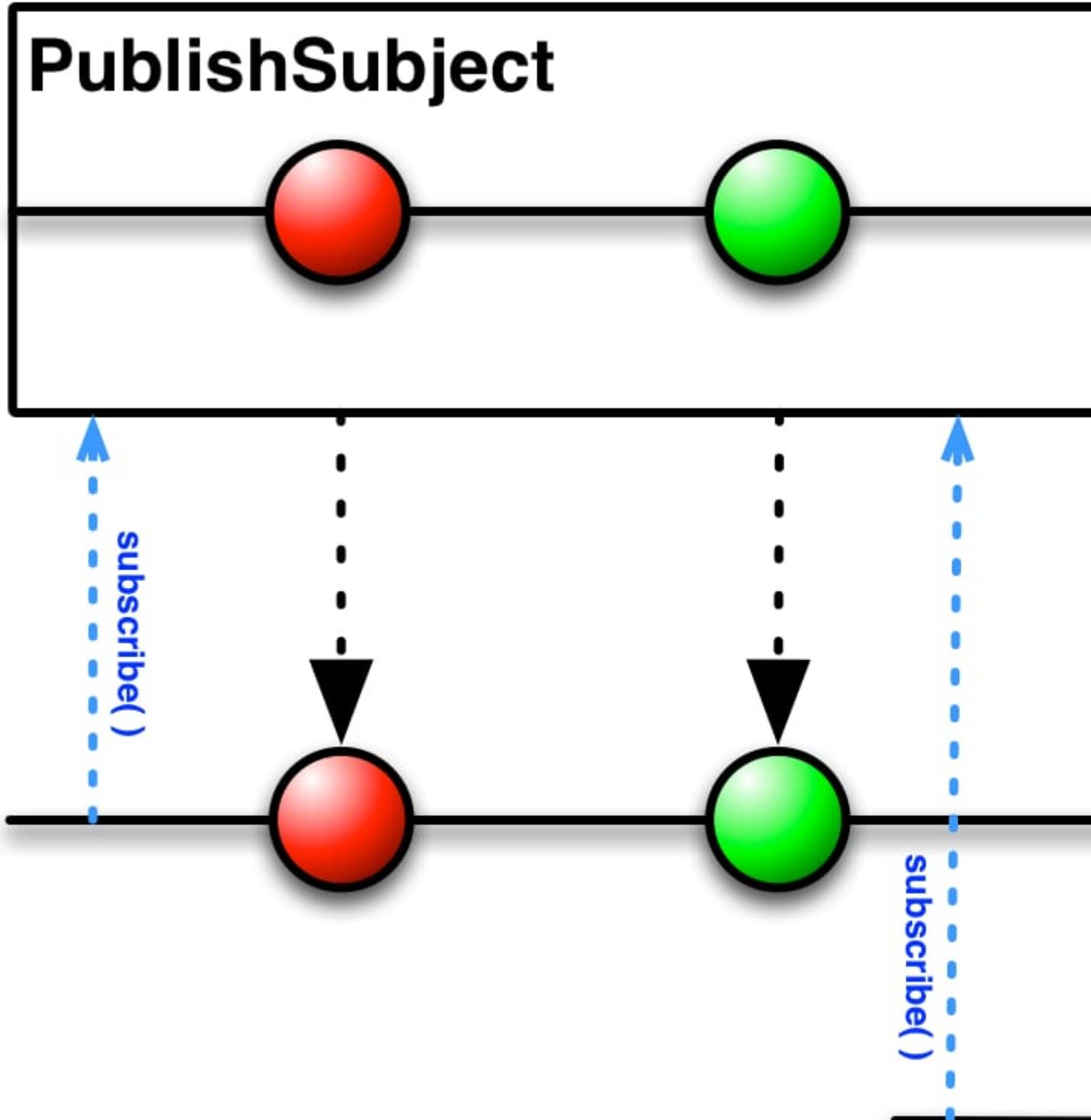
n PublishSubject **n**◦

PublishSubject



```
PublishSubjectObservableonCompleted◦
```

ObservablePublishSubject Observable。



o

```
/* Dummy stock prices */
Observable<Integer> prices = Observable.just(11, 12, 14, 11, 10, 12, 15, 11, 10);

/* Your server */
```

```
PublishSubject<Integer> watcher = PublishSubject.create();
/* subscribe to listen to stock price changes and push to observers/clients */
prices.subscribe(watcher);

/* Client application */
stockWatcher = getWatcherInstance(); // gets subject
Subscription steve = stockWatcher.subscribe(i -> System.out.println("steve watching " + i));
Thread.sleep(1000);
System.out.println("steve stops watching");
steve.unsubscribe();
```

PublishSubject`watcher`.

- `PublishSubject` [javadocs](#)
- Thomas Nield

<https://riptutorial.com/zh-TW/rx-java/topic/3287/>

5:

Examples

Observable

RxJavaObservable◦ Observable.create◦ ◦ ◦

Observable.just◦

```
Observable.just("Hello World").subscribe(System.out::println);
```

Observable.fromCallable◦

```
Observable.fromCallable(() -> longComputation()).subscribe(System.out::println);
```

ObservablelongComputation()◦ ◦

Observable.deferObservable.fromCallableObservable◦ ◦

```
Observable.defer(() -> {
    try {
        return Observable.just(longComputation());
    } catch(SpecificException e) {
        return Observable.error(e);
    }).subscribe(System.out::println);
```

HotCold◦

Cold ObservableHot Observable◦

```
/* Demonstration of a Cold Observable */
Observable<Long> cold = Observable.interval(500, TimeUnit.MILLISECONDS); // emits a long every
500 milli seconds
cold.subscribe(l -> System.out.println("sub1, " + l)); // subscriber1
Thread.sleep(1000); // interval between the two subscribes
cold.subscribe(l -> System.out.println("sub2, " + l)); // subscriber2
```

```
sub1, 0      -> subscriber1 starts
sub1, 1
sub1, 2
sub2, 0      -> subscriber2 starts
sub1, 3
sub2, 1
sub1, 4
```

```
sub2, 2
```

```
sub2。 Cold Observable。。
```

Hot observables。。

```
publishCold ObservableHot Observable。
```

```
Observable.interval(500, TimeUnit.MILLISECONDS)
    .publish(); // publish converts cold to hot
```

```
publishConnectableObservable observable。
```

```
ConnectableObservable<Long> hot = Observable
    .interval(500, TimeUnit.MILLISECONDS)
    .publish(); // returns ConnectableObservable
hot.connect(); // connect to subscribe

hot.subscribe(l -> System.out.println("sub1, " + l));
Thread.sleep(1000);
hot.subscribe(l -> System.out.println("sub2, " + l));
```

```
sub1, 0 -> subscriber1 starts
sub1, 1
sub1, 2
sub2, 2 -> subscriber2 starts
sub1, 3
sub2, 3
```

```
sub2sub1。
```

```
SubscriptionObservable。
```

```
ConnectableObservable<Long> hot = Observable
    .interval(500, TimeUnit.MILLISECONDS)
    .publish(); // same as above
Subscription subscription = hot.connect(); // connect returns a subscription object, which we
store for further use

hot.subscribe(l -> System.out.println("sub1, " + l));
Thread.sleep(1000);
hot.subscribe(l -> System.out.println("sub2, " + l));
Thread.sleep(1000);
subscription.unsubscribe(); // disconnect, or unsubscribe from subscription

System.out.println("reconnecting");
/* reconnect and redo */
subscription = hot.connect();
hot.subscribe(l -> System.out.println("sub1, " + l));
Thread.sleep(1000);
hot.subscribe(l -> System.out.println("sub2, " + l));
Thread.sleep(1000);
subscription.unsubscribe();
```

```
sub1, 0    -> subscriber1 starts
sub1, 1
sub1, 2
sub2, 2    -> subscriber2 starts
sub1, 3
sub2, 3
reconnecting -> reconnect after unsubscribe
sub1, 0
...
...
```

Observable”。

Hot ObservableEventBus ◦ EventBuses◦ RxBus◦

<https://riptutorial.com/zh-TW/rx-java/topic/1418/>

SchedulerJVMRxJava。 TestScheduler。 Schedulers。

Examples

TestSubscriber

TestSubscribersAction <> Observable。

1,2,34onNextObservable。

```
TestSubscriber<Integer> ts = TestSubscriber.create();
Observable.just(1,2,3,4).subscribe(ts);
ts.assertValues(1,2,3,4); // Success
```

assertValues。

```
TestSubscriber<Integer> ts = TestSubscriber.create();
Observable.just(1,2,3,4).subscribe(ts);
ts.assertValues(1,2,3); // Fail
```

assertValueequals。

```
TestSubscriber<Object> ts = TestSubscriber.create();
Observable.just(new Object(), new Object()).subscribe(ts);
ts.assertValues(new Object(), new Object()); // Fail
```

Observable。

```
public class Room {

    public String floor;
    public String number;

    @Override
    public boolean equals(Object o) {
        if (o == this) {
            return true;
        }
        if (o instanceof Room) {
            Room that = (Room) o;
            return (this.floor.equals(that.floor))
                && (this.number.equals(that.number));
        }
        return false;
    }
}
```

```
TestSubscriber<Room> ts = TestSubscriber.create();
Observable.just(new Room("1", "10")).subscribe(ts);
ts.assertValue(new Room("1", "10")); // Success
```

assertValue.

.

```
TestSubscriber<Integer> ts = TestSubscriber.create();
Observable.just(1,2,3,4).subscribe(ts);
List<Integer> onNextEvents = ts.getOnNextEvents();
List<Throwable> onErrorEvents = ts.getOnErrorEvents();
List<Notification<Integer>> onCompletedEvents = ts.getOnCompletedEvents();
```

getOnNextEvents getOn*Events

```
Observable<Integer> obs = Observable.just(1,2,3,4)
    .filter( x -> x % 2 == 0);

// note that we instanciate TestSubscriber via the constructor here
TestSubscriber<Integer> ts = new TestSubscriber();
obs.subscribe(ts);

// Note that we are not using Observable#forEach here
// but java.lang.Iterable#forEach.
// You should never use Observable#forEach unless you know
// exactly what you're doing
ts.getOnNextEvents()
    .forEach( integer -> assertTrue(integer % 2 == 0));
```

Observable#error

```
Observable<Integer> obs = Observable.error(new Exception("I am a Teapot"));

TestSubscriber<Integer> ts = new TestSubscriber<>();
obs.subscribe(ts);

ts.assertError(Exception.class);
```

```
Exception e = new Exception("I am a Teapot");
Observable<Integer> obs = Observable.error(e);

TestSubscriber<Integer> ts = new TestSubscriber<>();
obs.subscribe(ts);

ts.assertError(e);
```

TestScheduler

TestSchedulersObservables. . .

TestSchedulersRxJava

```
TestScheduler testScheduler = new TestScheduler();
TestSubscriber<Integer> subscriber = TestSubscriber.create();
Observable.just(1,2,3)
    .delay(10, TimeUnit.SECONDS, testScheduler)
    .subscribe(subscriber);

try {
    Thread.sleep(TimeUnit.SECONDS.toMillis(11));
} catch (InterruptedException ignored) { }
subscriber.assertValues(1,2,3); // fails

testScheduler.advanceTimeBy(10, TimeUnit.SECONDS);
subscriber.assertValues(1,2,3); // success
```

TestScheduler

```
testScheduler.advanceTimeBy(amount, timeUnit);
testScheduler.advanceTimeTo(when, timeUnit);
testScheduler.triggerActions();
```

TestScheduler.

TestScheduler。。RxJavaSchedulers.io/ computation/ etc。 RxJavaHooks。 Scheduler。

```
public final class TestSchedulers {  
  
    public static TestScheduler test() {  
        final TestScheduler testScheduler = new TestScheduler();  
        RxJavaHooks.reset();  
        RxJavaHooks.setOnComputationScheduler((scheduler) -> {  
            return testScheduler;  
        });  
        RxJavaHooks.setOnIOScheduler((scheduler) -> {  
            return testScheduler;  
        });  
        RxJavaHooks.setOnNewThreadScheduler((scheduler) -> {  
            return testScheduler;  
        });  
        return testScheduler;  
    }  
}
```

◦◦ TestScheduler◦◦

```
TestScheduler testScheduler = new TestScheduler();
TestSubscriber<Integer> subscriber = TestSubscriber.create();
Observable.just(1,2,3)
    .delay(10, TimeUnit.SECONDS, testScheduler)
    .subscribe(subscriber);
testScheduler.advanceTimeBy(9, TimeUnit.SECONDS);
subscriber.assertValues(); // success (delay hasn't finished)
testScheduler.advanceTimeBy(10, TimeUnit.SECONDS);
subscriber.assertValues(1,2,3); // success (delay has finished)
```

RxJava

<https://riptutorial.com/zh-TW/rx-java/topic/5207/>

7: RxJava

Examples

RetrofitRxJava

Retrofit2RxJava

RxJavaRetrofit RxJava

```
compile 'com.squareup.retrofit2:adapter-rxjava:2.1.0'
```

```
Retrofit retrofit = new Retrofit.Builder()
    .baseUrl("https://api.example.com")
    .addCallAdapterFactory(RxJavaCallAdapterFactory.create())
    .build();
```

API Observable

```
public interface GitHubService {
    @GET("users/{user}/repos")
    Observable<List<Repo>> listRepos(@Path("user") String user);
}
```

SingleObservable

RxJava flatMap

```
api.getRepo(repoId).flatMap(repo -> api.getUser(repo.getOwnerId()))
    .subscribe(/*do something with the result*/);
```

zip

```
Observable.zip(api.getRepo(repoId1), api.getRepo(repoId2), (repo1, repo2) ->
{
    //here you can combine the results
}).subscribe(/*do something with the result*/);
```

RxJava <https://riptutorial.com/zh-TW/rx-java/topic/2950/rxjava>

8:

Examples

Observable。

```
PublishSubject<Integer> source = PublishSubject.create();

source
.observeOn(Schedulers.computation())
.subscribe(v -> compute(v), Throwable::printStackTrace);

for (int i = 0; i < 1_000_000; i++) {
    source.onNext(i);
}

Thread.sleep(10_000);
```

100。 compute(int) Observable。 foronNext。

◦ Rx.NETRxJava100。 101001000OutOfMemoryErrorGC。

onErrorXXXonBackpressureXXX。

PublishSubject。 interval。

RxJavaobserveOn MissingBackpressureException。。

MissingBackpressureException。

```
Observable.range(1, 1_000_000)
.observeOn(Schedulers.computation())
.subscribe(v -> compute(v), Throwable::printStackTrace);

Thread.sleep(10_000);
```

◦ “” observeOnrange observeOn。

◦ rangeProducerSubscriber setProducerobserveOn。 observeOnProducer.request(n) range onNext。 observeOnrequest。

```
Observable.range(1, 1_000_000)
.subscribe(new Subscriber<Integer>() {
    @Override
    public void onStart() {
        request(1);
    }

    public void onNext(Integer v) {
        compute(v);
    }
});
```

```

        request(1);
    }

    @Override
    public void onError(Throwable ex) {
        ex.printStackTrace();
    }

    @Override
    public void onCompleted() {
        System.out.println("Done!");
    }
});

});
```

onStartrange onNextonNext ° compute(int)range° rangeonNext StackOverflowError °

◦ rangeonNext () request(1)onNext ()onNext () °

```

@Override
public void onNext(Integer v) {
    request(1);

    compute(v);
}
```

onStart° ObservableSubscriberrequest(1)° onNextrequest(1)

```

Observable.range(1, 1_000_000)
.subscribe(new Subscriber<Integer>() {

    String name;

    @Override
    public void onStart() {
        request(1);

        name = "RangeExample";
    }

    @Override
    public void onNext(Integer v) {
        compute(name.length + v);

        request(1);
    }

    // ... rest is the same
});
```

onStartNullPointerException ° request(1)onNextnameonNextonStartrequest °

onStartrequest () ° request ()°

onBackpressureXXX

```
MissingBackpressureException observeOn PublishSubject timer() interval() create()。
```

◦

◦ observeOn **Android16**◦

RxJava◦ bufferSize prefetchCapacityHint ◦ observeOn◦

```
PublishSubject<Integer> source = PublishSubject.create();

source.observeOn(Schedulers.computation(), 1024 * 1024)
    .subscribe(e -> { }, Throwable::printStackTrace);

for (int i = 0; i < 1_000_000; i++) {
    source.onNext(i);
}
```

◦ ◦

/

/MissingBackpressureException◦

```
PublishSubject<Integer> source = PublishSubject.create();

source
    .buffer(1024)
    .observeOn(Schedulers.computation(), 1024)
    .subscribe(list -> {
        list.parallelStream().map(e -> e * e).first();
    }, Throwable::printStackTrace);

for (int i = 0; i < 1_000_000; i++) {
    source.onNext(i);
}
```

Observable throttleFirst throttleLast throttleWithTimeout◦

```
PublishSubject<Integer> source = PublishSubject.create();

source
    .sample(1, TimeUnit.MILLISECONDS)
    .observeOn(Schedulers.computation(), 1024)
    .subscribe(v -> compute(v), Throwable::printStackTrace);

for (int i = 0; i < 1_000_000; i++) {
    source.onNext(i);
}
```

MissingBackpressureException◦

onBackpressureBuffer

- JVM◦

```
Observable.range(1, 1_000_000)
    .onBackpressureBuffer()
    .observeOn(Schedulers.computation(), 8)
    .subscribe(e -> { }, Throwables::printStackTrace);
```

observeOnMissingBackpressureExceptiononBackpressureBuffer100observeOn◦

onBackpressureBuffer◦ range◦

onBackpressureBuffer4

onBackpressureBufferint capacity

BufferOverflowError◦

```
Observable.range(1, 1_000_000)
    .onBackpressureBuffer(16)
    .observeOn(Schedulers.computation())
    .subscribe(e -> { }, Throwables::printStackTrace);
```

◦ “”onBackpressureBuffer◦

onBackpressureBufferint capacityAction0 onOverflow

◦ ◦

onBackpressureBufferint capacityAction0 onOverflow BackpressureOverflow.Strategy strategy

◦ BackpressureOverflow.StrategyBackpressureOverflow4

- ON_OVERFLOW_ERROR BufferOverflowException
- ON_OVERFLOW_DEFAULT ON_OVERFLOW_ERROR
- ON_OVERFLOW_DROP_LATEST ◦
- ON_OVERFLOW_DROP_OLDEST ◦

```
Observable.range(1, 1_000_000)
    .onBackpressureBuffer(16, () -> { },
        BufferOverflowStrategy.ON_OVERFLOW_DROP_OLDEST)
    .observeOn(Schedulers.computation())
    .subscribe(e -> { }, Throwables::printStackTrace);
```

◦ BufferOverflowException◦

onBackpressureDrop

element。OnBackpressureBufferON_OVERFLOW_DROP_LATEST。

GPS。

```
component.mouseMoves()
.onBackpressureDrop()
.observeOn(Schedulers.computation(), 1)
.subscribe(event -> compute(event.x, event.y));
```

interval()。

```
Observable.interval(1, TimeUnit.MINUTES)
.onBackpressureDrop()
.observeOn(Schedulers.io())
.doOnNext(e -> networkCall.doStuff())
.subscribe(v -> { }, Throwable::printStackTrace);
```

onBackpressureDrop(Action1<? super T> onDrop)。。

onBackpressureLatest

◦ onBackpressureBuffer1ON_OVERFLOW_DROP_OLDEST◦

onBackpressureDrop◦

◦

```
component.mouseClicks()
.onBackpressureLatest()
.observeOn(Schedulers.computation())
.subscribe(event -> compute(event.x, event.y), Throwable::printStackTrace);
```

onBackpressureDrop◦

Observable◦“”/“”◦

just

```
Observable.just(1).subscribe(new Subscriber<Integer>() {
    @Override
    public void onStart() {
        request(0);
    }

    @Override
    public void onNext(Integer v) {
        System.out.println(v);
    }

    // the rest is omitted for brevity
})
```

```
onStart。 just。
```

```
justSubscriber S
```

```
int counter;  
  
int computeValue() {  
    return ++counter;  
}  
  
Observable<Integer> o = Observable.just(computeValue());  
  
o.subscribe(System.out::println);  
o.subscribe(System.out::println);
```

112。

```
int temp = computeValue();  
  
Observable<Integer> o = Observable.just(temp);
```

```
computeValue。
```

fromCallable

```
fromCallable
```

```
Observable<Integer> o = Observable.fromCallable(() -> computeValue());
```

```
computeValue 12. fromCallable。 justmap
```

```
Observable.just("This doesn't matter").map(ignored -> computeValue())...
```

```
justcomputeValue。
```

```
Iterablefrom
```

```
Observable.from(Arrays.asList(1, 2, 3, 4, 5)).subscribe(System.out::println);
```

210 justfrom。

```
from(Iterable)。 。 。
```

IterableObservable CJava yield returnyield break。 Google Guava AbstractIterable IxJava
Ix.generate() Ix.forloop()。 Iterable

```
Iterable<Integer> iterable = () -> new Iterator<Integer>() {  
    @Override  
    public boolean hasNext() {  
        return true;
```

```

    }

    @Override
    public Integer next() {
        return 1;
    }
};

Observable.from(iterator).take(5).subscribe(System.out::println);

```

for iterator。 Observable 5。 Observable。

SyncOnSubscribe

getread。 Iterable。

RxJava SyncOnSubscribe。 lambda。

```

SyncOnSubscribe<Integer, InputStream> binaryReader = SyncOnSubscribe.createStateful(
    () -> new FileInputStream("data.bin"),
    (inputstream, output) -> {
        try {
            int byte = inputstream.read();
            if (byte < 0) {
                output.onCompleted();
            } else {
                output.onNext(byte);
            }
        } catch (IOException ex) {
            output.onError(ex);
        }
        return inputstream;
    },
    inputstream -> {
        try {
            inputstream.close();
        } catch (IOException ex) {
            RxJavaHooks.onError(ex);
        }
    }
);

Observable<Integer> o = Observable.create(binaryReader);

```

SyncOnSubscribe3。

```

FileInputStream;

Observer onXXX。 。 onNextonErroronCompleted。 onCompleted() IOException onError。

;。 SyncOnSubscribe。

```

JVM try-catch es。

```
SyncOnSubscribe.createStateful(  
    () -> 0,  
    (current, output) -> {  
        output.onNext(current);  
        return current + 1;  
    },  
    e -> {}  
) ;
```

current0**lambda**current1。

AsyncOnSubscribeSyncOnSubscribeObservable。 Observable。

```
AsyncOnSubscribe.createStateful(  
    () -> 0,  
    (state, requested, output) -> {  
        output.onNext(Observable.range(state, (int)requested));  
        return state + 1;  
    },  
    e -> {}  
) ;
```

◦ ◦

Observable**API**。

RxJava**create(emitter)**。

- Emitter<T>
- Emitter.BackpressureMode。 onBackpressureXXX MissingBackpressureException。

◦ NONEObservableonBackpressureXXXonBackpressureXXX。

GUI。 APIaddListener / removeListener

```
Observable.create(emitter -> {  
    ActionListener al = e -> {  
        emitter.onNext(e);  
    };  
  
    button.addActionListener(al);  
  
    emitter.setCancellation(() ->  
        button.removeListener(al));  
  
, BackpressureMode.BUFFER);
```

Emitter;onNext onErroronCompleted。 APIsetCancellation setSubscription Subscription
setSubscription onError /。 EmitteronCompleted。

◦ CompositeSubscription CompositeSubscription

```
Observable.create(emitter -> {
```

```

CompositeSubscription cs = new CompositeSubscription();

Worker worker = Schedulers.computation().createWorker();

ActionListener al = e -> {
    emitter.onNext(e);
};

button.addActionListener(al);

cs.add(worker);
cs.add(Subscriptions.create(() ->
    button.removeActionListener(al)));
emitter.setSubscription(cs);

}, BackpressureMode.BUFFER);

```

API Observable ◦

```

Observable.create(emitter -> {

    someAPI.remoteCall(new Callback<Data>() {
        @Override
        public void onSuccess(Data data) {
            emitter.onNext(data);
            emitter.onCompleted();
        }

        @Override
        public void onFailure(Exception error) {
            emitter.onError(error);
        }
    });
}, BackpressureMode.LATEST);

```

◦ API previous ◦ LATEST,BUFFER128◦

<https://riptutorial.com/zh-TW/rx-java/topic/2341/>

Examples

RxJava · Executor ·

Scheduler

- FIFO
-

Scheduler delay subscribeOn / observeOn

Scheduler · delay · Scheduler ·

Observable subscribeOn · Scheduler ·

Observable observeOn · Scheduler observeOn · observeOn ·

subscribeOn

```
// this lambda will be executed in the `Schedulers.io()`
Observable.fromCallable(() -> Thread.currentThread().getName())
    .subscribeOn(Schedulers.io())
    .subscribe(System.out::println);
```

Scheduler

```
Observable.fromCallable(() -> "Thread -> " + Thread.currentThread().getName())
    // next tasks will be executed in the io scheduler
    .observeOn(Schedulers.io())
    .map(str -> str + " -> " + Thread.currentThread().getName())
    // next tasks will be executed in the computation scheduler
    .observeOn(Schedulers.computation())
    .map(str -> str + " -> " + Thread.currentThread().getName())
    // next tasks will be executed in the io scheduler
    .observeOn(Schedulers.newThread())
    .subscribe(str -> System.out.println(str + " -> " +
    Thread.currentThread().getName()));
```

Scheduler ·

```
Observable.just(1)
    // the onNext method of the delay operator will be executed in a new thread
    .delay(1, TimeUnit.SECONDS, Schedulers.newThread())
    .subscribe(System.out::println);
```

```
TestScheduler testScheduler = Schedulers.test();
EventBus sut = new DefaultEventBus(testScheduler);
TestSubscriber<Event> subscriber = new TestSubscriber<Event>();
sut.get().subscribe(subscriber);
```

```
sut.publish(event);
testScheduler.advanceTimeBy(1, TimeUnit.SECONDS);
```

```
this.poolName = schedulerFig.getIoSchedulerName();
final int poolSize = schedulerFig.getMaxIoThreads();
final BlockingQueue<Runnable> queue = new ArrayBlockingQueue<Runnable>(poolSize);
final MaxSizeThreadPool threadPool = new MaxSizeThreadPool( queue, poolSize );
this.scheduler = Schedulers.from(threadPool);
```

Web Socket Observable

```
final Subscription subscribe = socket.webSocketObservable()
    .subscribeOn(Schedulers.io())
    .doOnNext(new Action1<RxEvent>() {
        @Override
        public void call(RxEvent rxEvent) {
            System.out.println("Event: " + rxEvent);
        }
    })
    .subscribe();
```

<https://riptutorial.com/zh-TW/rx-java/topic/2321/>

10:

◦

Examples

ObservableSubscriber◦

```
Observable<Integer> integerObservable = Observable.just(1, 2, 3); // creating a simple Integer observable
Subscriber<String> mSubscriber = new Subscriber<String>() {
    @Override
    public void onCompleted() {
        System.out.println("onCompleted called!");
    }

    @Override
    public void onError(Throwable throwable) {
        System.out.println("onError called");
    }

    @Override
    public void onNext(String string) {
        System.out.println("onNext called with: " + string);
    }
}; // a simple String subscriber

integerObservable
    .map(new Func1<Integer, String>() {
        @Override
        public String call(Integer integer) {
            switch (integer) {
                case 1:
                    return "one";
                case 2:
                    return "two";
                case 3:
                    return "three";
                default:
                    return "zero";
            }
        }
    })
    .subscribe(mSubscriber);
```

```
onNext called with: one
onNext called with: two
onNext called with: three
onCompleted called!
```

mapInteger observableString observable◦

chained◦

```
integerObservable // emits 1, 2, 3
    .map(i -> i + 10) // adds 10 to each item; emits 11, 12, 13
    .filter(i -> i > 11) // emits items that satisfy condition; 12, 13
    .last() // emits last item in observable; 13
    // unlimited operators can be added ...
    .subscribe(System.out::println); // prints 13
```

ObservableSubscriber。

flatMap

flatMapObservable。

Observable

```
public Observable<String> perform(int i) {
    // ...
}

Observable.just(1, 2, 3)
    .flatMap(i -> perform(i))
    .subscribe(result -> System.out.println("result ->" + result));
```

flatMap perform performconcatMap。

Observable flatMap。 **Observable**

```
Observable.just(1, 2, 3)
    .subscribe(i -> perform(i));
```

```
Observable.just(1, 2, 3)
    .flatMap(i -> perform(i))
    .subscribe();
```

Reactivex.io <http://reactivex.io/documentation/operators/flatmap.html>

filter。

ObserverSubscriber filterfalse。

```
List<Integer> integers = Arrays.asList(0, 1, 2, 3, 4, 5, 6, 7, 8, 9);

Observable.from(integers)
    .filter(number -> {
        return (number % 2 == 0);
        // odd numbers will return false, that will cause them to be filtered
    })
    .map(i -> {
        return Math.pow(i, 2); // take each number and multiply by power of 2
    })
    .subscribe(onNext -> {
        System.out.println(onNext); // print out the remaining numbers
    });
});
```

```
0.0  
4.0  
16.0  
36.0  
64.0
```

```
mapmap o o
```

```
.map () o
```

```
List<Integer> numbers = Arrays.asList(1, 2, 3);  
Observable.from(numbers)  
    .map(number -> {  
        return number.toString(); // convert each integer into a string and return it  
    })  
    .subscribe(onNext -> {  
        System.out.println(onNext); // print out the strings  
    });
```

```
"1"  
"2"  
"3"
```

Observable List<Integer> List<String> .subscribeString

doOnNext

```
doOnNext Observable doOnNext o ...
```

```
Observable.range(1, 3)  
    .doOnNext(value -> System.out.println("before transform: " + value))  
    .map(value -> value * 2)  
    .doOnNext(value -> System.out.println("after transform: " + value))  
    .subscribe();
```

```
doOnNext Observable Observable.empty() onCompleted o
```

```
Observable.empty()  
    .doOnNext(item -> System.out.println("item: " + item))  
    .subscribe();
```

```
repeat Observable o
```

```
Observable.just(1, 2, 3)  
    .repeat()  
    .subscribe(  
        next -> System.out.println("next: " + next),  
        error -> System.out.println("error: " + error),  
        () -> System.out.println("complete")  
    );
```

```
next: 1
next: 2
next: 3
next: 1
next: 2
next: 3
```

o

repeat。

```
Observable.just(1, 2, 3)
    // Repeat three times and complete
    .repeat(3)
    .subscribe(
        next -> System.out.println("next: " + next),
        error -> System.out.println("error: " + error),
        () -> System.out.println("complete")
    );
```

```
next: 1
next: 2
next: 3
next: 1
next: 2
next: 3
next: 1
next: 2
next: 3
complete
```

Observable repeatObservable。 Observable.create。

```
Observable.<Integer>create(subscriber -> {
    //Same as Observable.just(1, 2, 3) but with output message
    System.out.println("Subscribed");
    subscriber.onNext(1);
    subscriber.onNext(2);
    subscriber.onNext(3);
    subscriber.onCompleted();
})
    .repeat(3)
    .subscribe(
        next -> System.out.println("next: " + next),
        error -> System.out.println("error: " + error),
        () -> System.out.println("complete")
    );
```

```
Subscribed
next: 1
next: 2
next: 3
Subscribed
next: 1
next: 2
```

```
next: 3
Subscribed
next: 1
next: 2
next: 3
complete
```

repeat。

```
Observable.<Integer>create(subscriber -> {
    System.out.println("Subscribed");
    subscriber.onNext(1);
    subscriber.onNext(2);
    subscriber.onNext(3);
    subscriber.onCompleted();
})
    .map(value -> value * 2) //First chain operator
    .map(value -> "modified " + value) //Second chain operator
    .repeat(3)
    .subscribe(
        next -> System.out.println("next: " + next),
        error -> System.out.println("error: " + error),
        () -> System.out.println("complete")
    );
}
```

```
Subscribed
next: modified 2
next: modified 4
next: modified 6
Subscribed
next: modified 2
next: modified 4
next: modified 6
Subscribed
next: modified 2
next: modified 4
next: modified 6
complete
```

repeatObservablemaprepeat。

```
Observable.<Integer>create(subscriber -> {
    //...
})
    .map(value -> value * 2) //First chain operator
    .map(value -> "modified " + value) //Second chain operator
    .repeat(3)
    .subscribe(
        /*....*/
    );
}
```

```
Observable.<Integer>create(subscriber -> {
    //...
})
    .repeat(3)
    .map(value -> value * 2) //First chain operator
```

```
.map(value -> "modified " + value) //Second chain operator  
.subscribe(  
    /*....*/  
) ;
```

<https://riptutorial.com/zh-TW/rx-java/topic/2316/>

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