Reactive Streams in Java

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A little background

BSC IN HAGENBERG
best University of Applied Sciences for Informatics in Austria

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MSC IN VIENNA
first Media Informatics, then switched to Software Engineering

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NOW
Frontend Tech Lead Developer at sports aggregator myClubs with React, TypeScript

A little background

Streams

Observables

Reactive Streams

Observable Sequence

...

Apr 20, 2021

Are there differences between Streams, Java Streams and Reactive Streams?

Streams and observables are often used interchangeably, but some say there is a difference between them. So what is it all about? While I was...

Observables 6 min read

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Observables 6 min read

well...sort of

ONE THING IN ADVANCE

A **stream** is simply

“a sequence of data elements
made available over time”

Szenario 1

Alice is at work

order Pizza at restaurant

wait until Pizza is ready

Pick up Bob

Watch a movie with Bob

Szenario 2

at work

go home

Start
eating pizza

order Pizza
online

Call Bob to
come over

Watch movie
without Bob

Szenario 3

at work

go home

Start
eating pizza

order Pizza
online

Call Bob to
come over

wait
for Bob

Watch movie
with Bob

WHAT DOES THIS MEAN IN PROGRAMMING?

01

02

03

WHAT DOES THIS MEAN IN PROGRAMMING?

01

Synchronous

02

03

WHAT DOES THIS MEAN IN PROGRAMMING?

01

Synchronous

02

Asynchronous

03

WHAT DOES THIS MEAN IN PROGRAMMING?

01

Synchronous

02

Asynchronous

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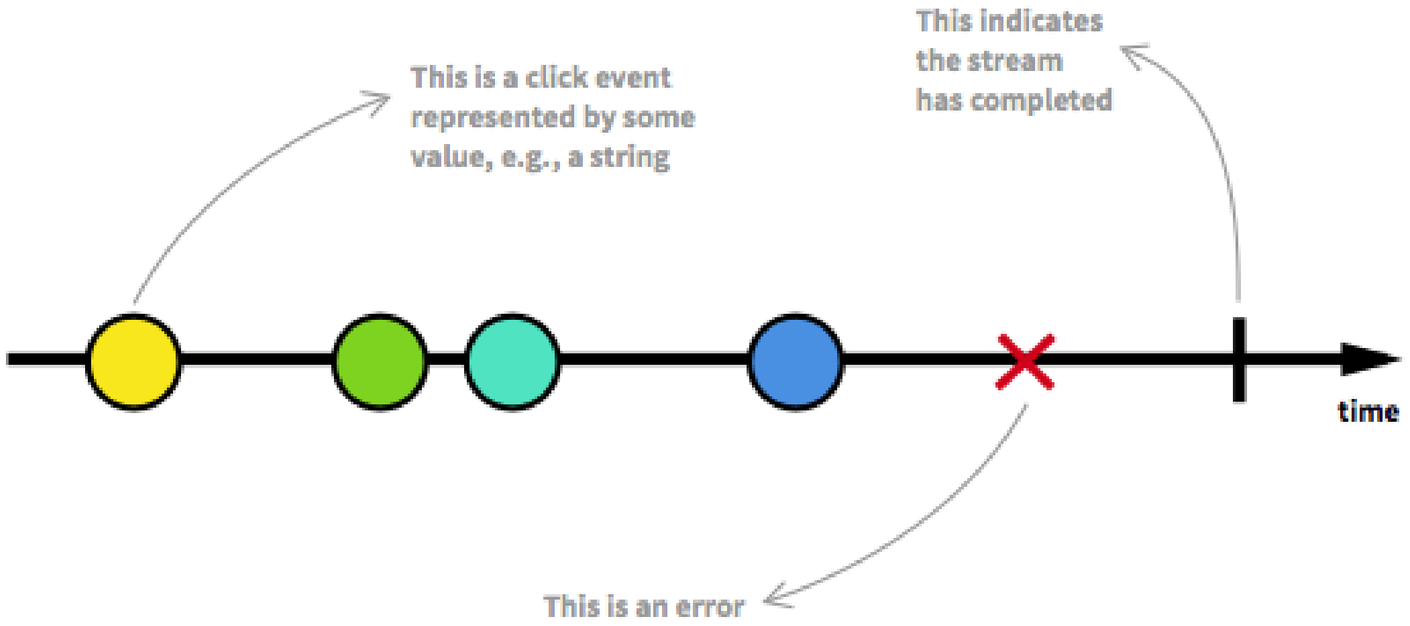
Reactive

What is Reactive Programming?

a programming paradigm
relying on events



```
var counter = 0;
$: doubled = counter * 2;
```

Reactive programming is programming with asynchronous data streams.

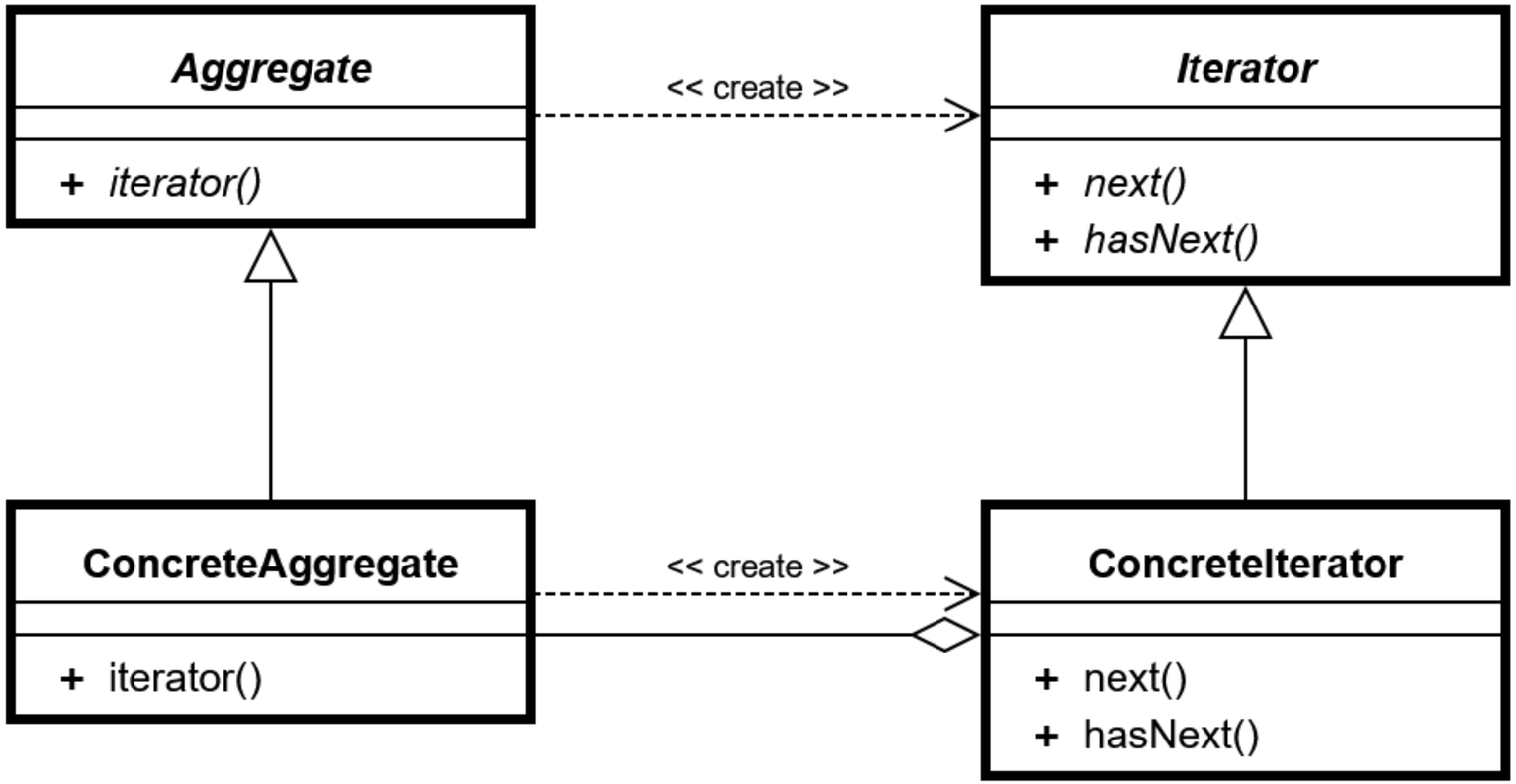
Andre Staltz
(Creator of XStream)

The Two Main Patterns of Reactive Progamming

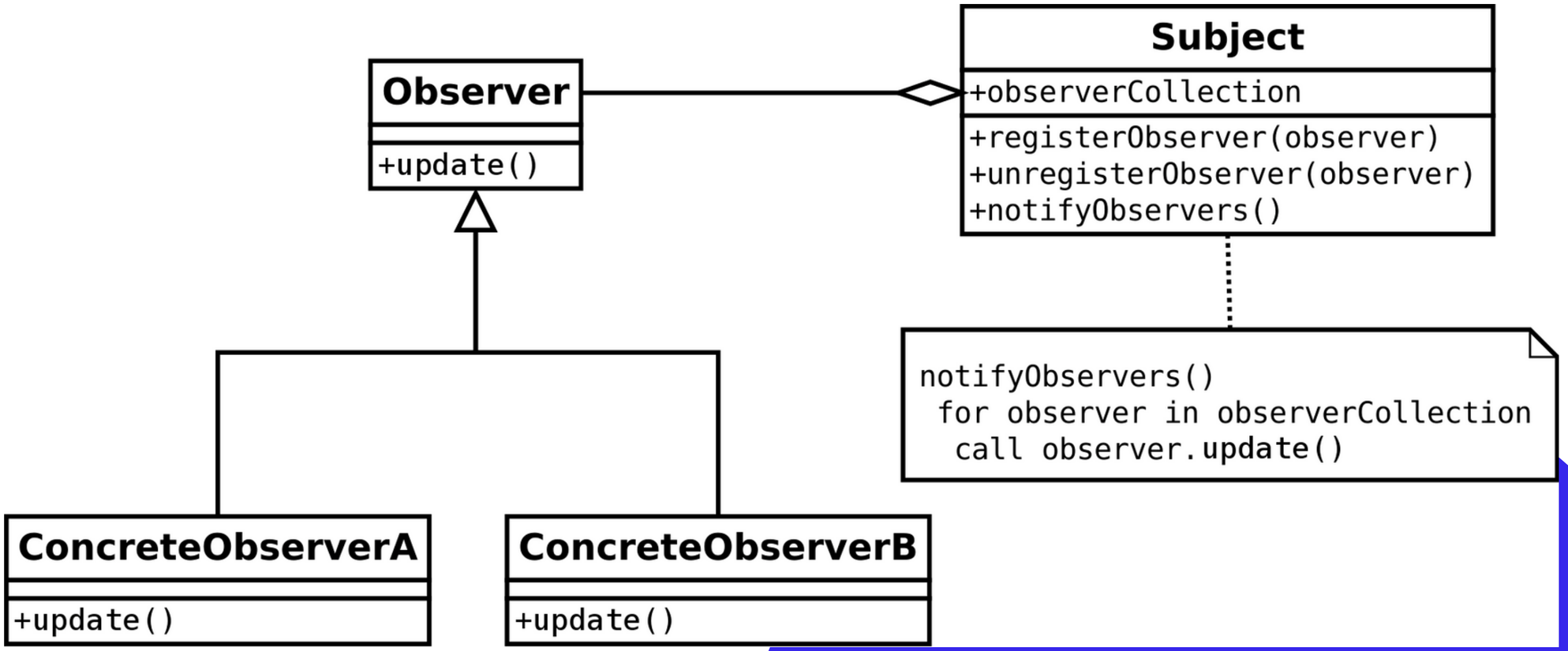
01 Iterator Pattern

02 Observer Pattern

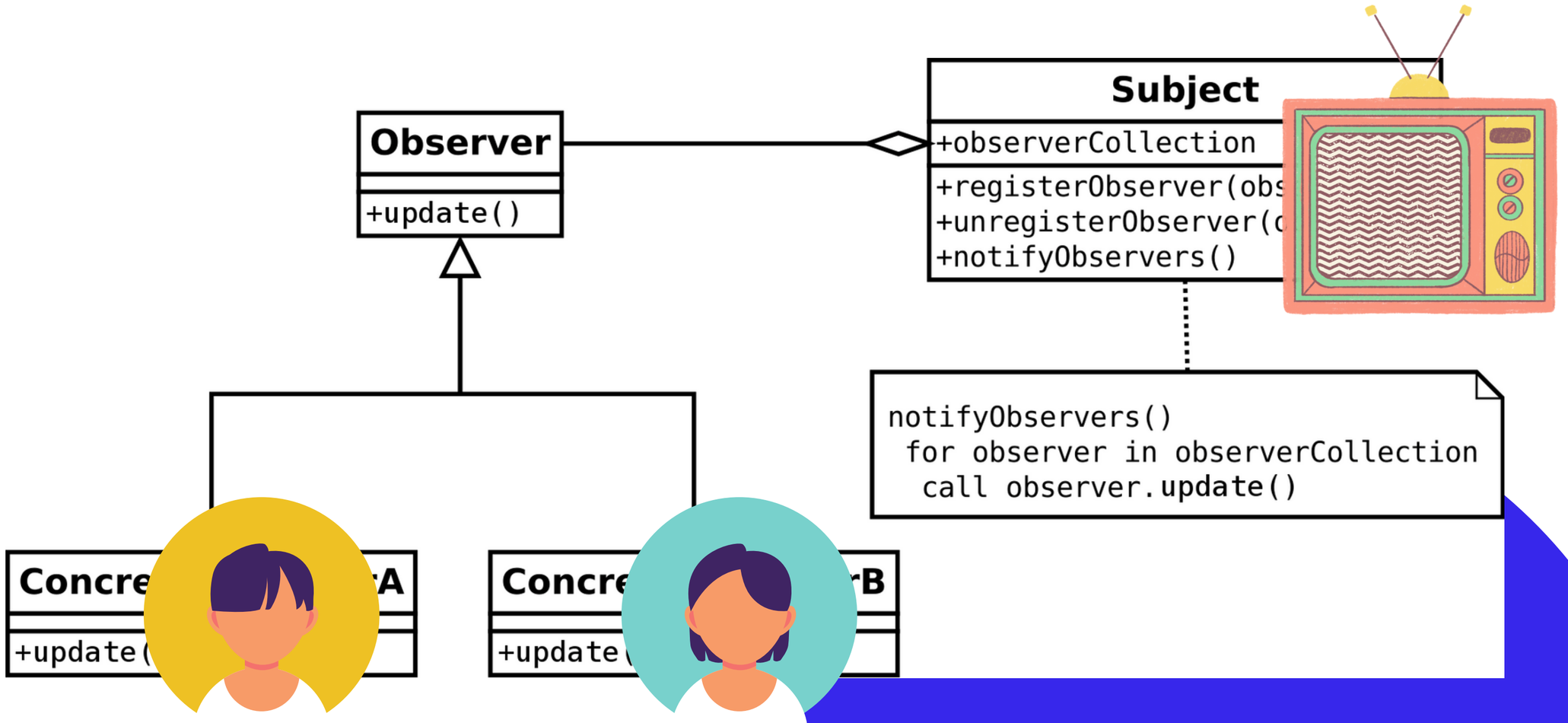
State: Iterator



Communication: Observer



Communication: Observer



Triad of Programming

01

State Management

02

Flow Control

03

Code Volume

We believe that the major contributor to this complexity in many systems is the **handling of state** and the burden that this adds when trying to analyze and reason about the system. Other closely related contributors are **code volume**, and explicit concern with the **flow of control** through the system.

Out of the Tar Pit
(2006)

Observable Streams

01 Encapsulate

Observable Streams

01 Encapsulate

02 Transport

Observable Streams

01 Encapsulate

02 Transport

03 Transform

Observable Streams

COMMUNICATE STATE OVER TIME

	SINGLE	MULTIPLE
SYNC	Function	Enumerable
ASYNC	Promise	Observable

	SINGLE	MULTIPLE
PULL	Function	Enumerable
PUSH	Promise	Observable

JAVA STREAMS?

Java Streams are pull-based, just like functions.

Not asynchronous.

SHOW ME CODE

CONCLUSION

JAVA STREAMS

- pull-based
- synchronous

OBSERVABLES

- an Object that has a function "registerObserver(observer)"
- Observable is the Subject being observed

REACTIVE STREAM/OBSERVABLE STREAM/OBSERVABLE SEQUENCE

- push-based
- asynchronous
- used in reactive Programming
- Since Java 9: Flow interface