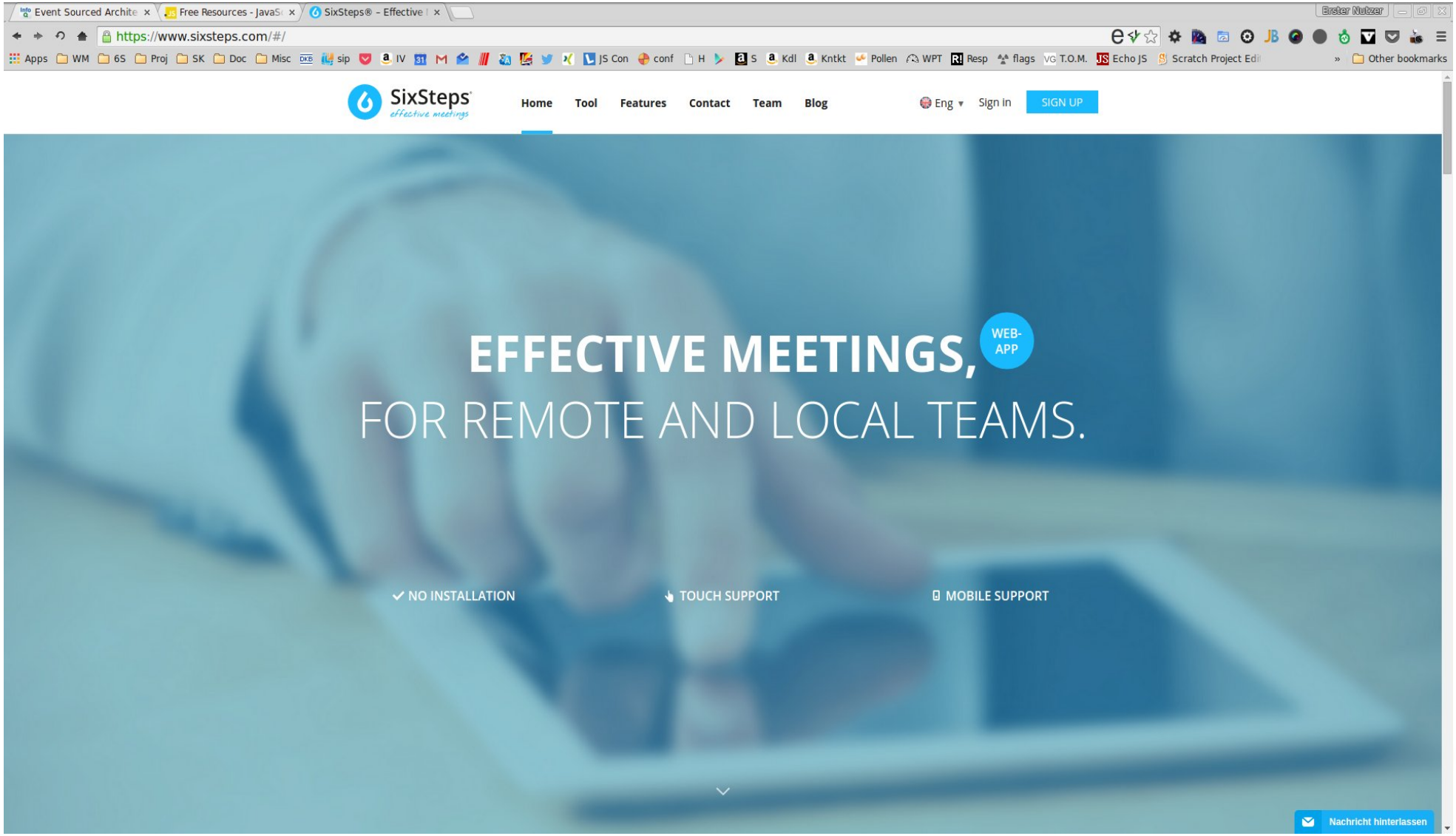
webmasters akademie Nürnberg GmbH

EventSourcing – was steckt dahinter?

Marco Emrich

Juni 2015 @ SWK Nürnberg

Sixsteps.com

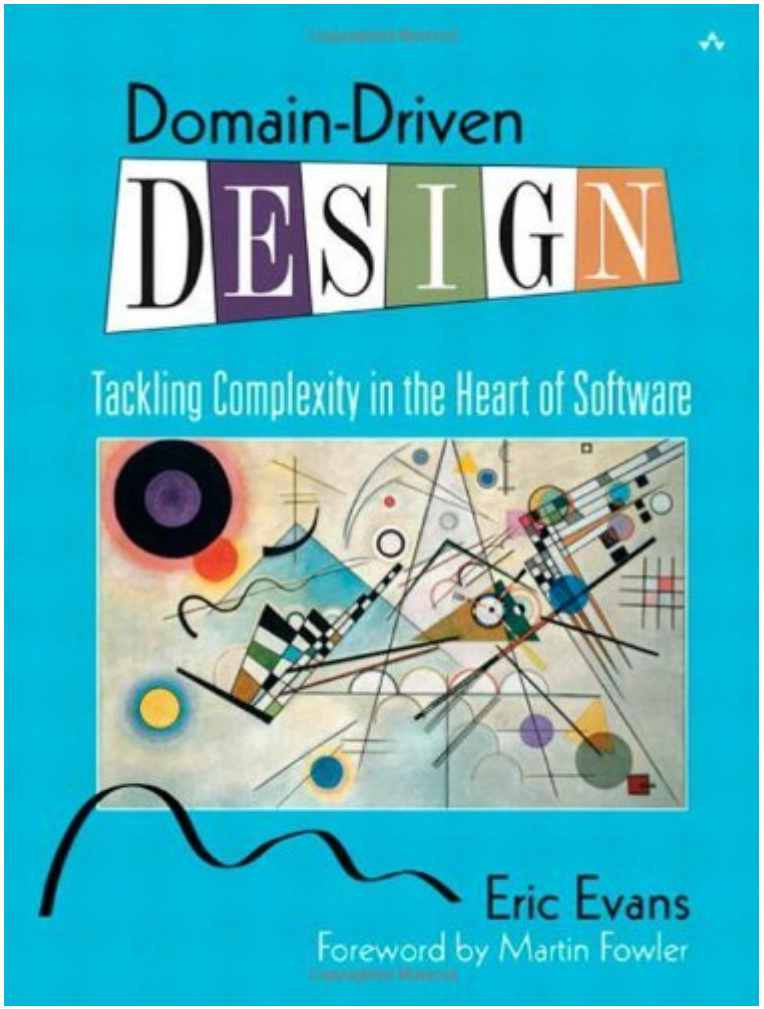


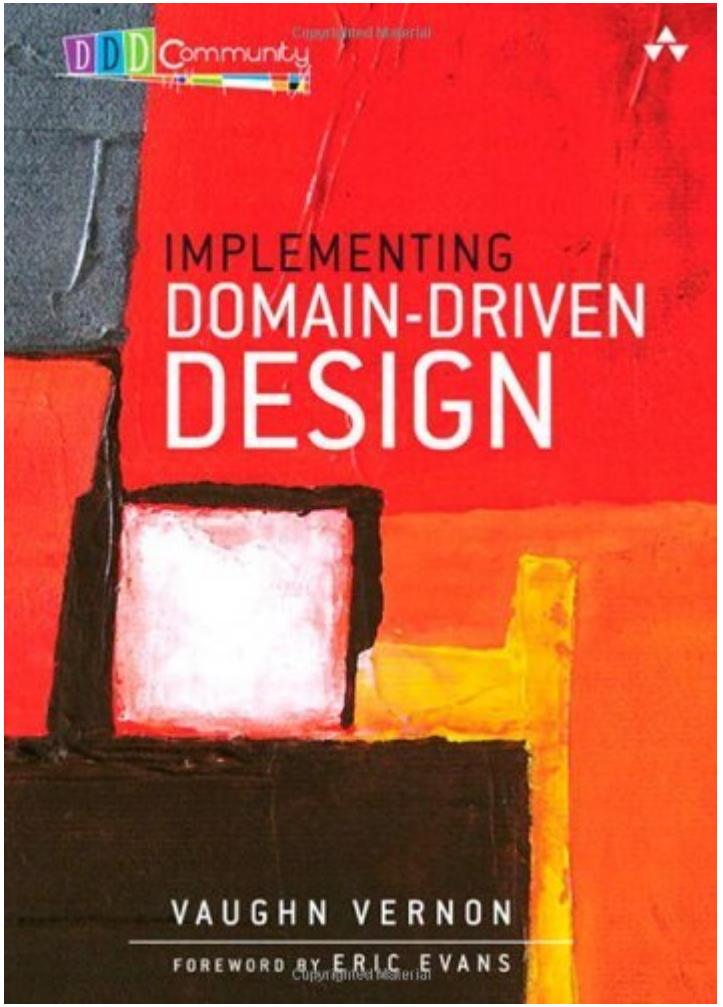
GUI

https://www.flickr.com/photos/joris/2410290034

Architecture

Domain Driven Design





Hexagonal Architecture

General Programming-Model

Method vs. Event

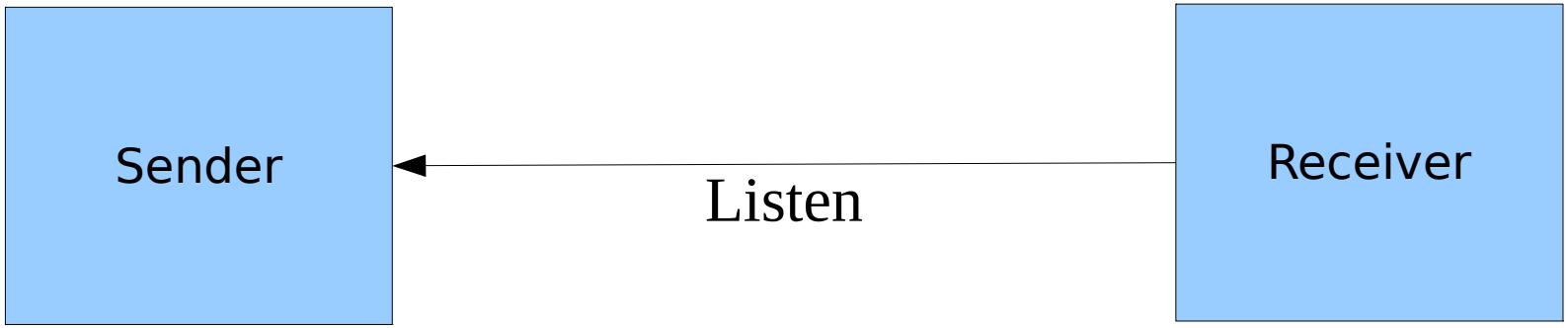
https://www.flickr.com/photos/gen/325927418

Method Call

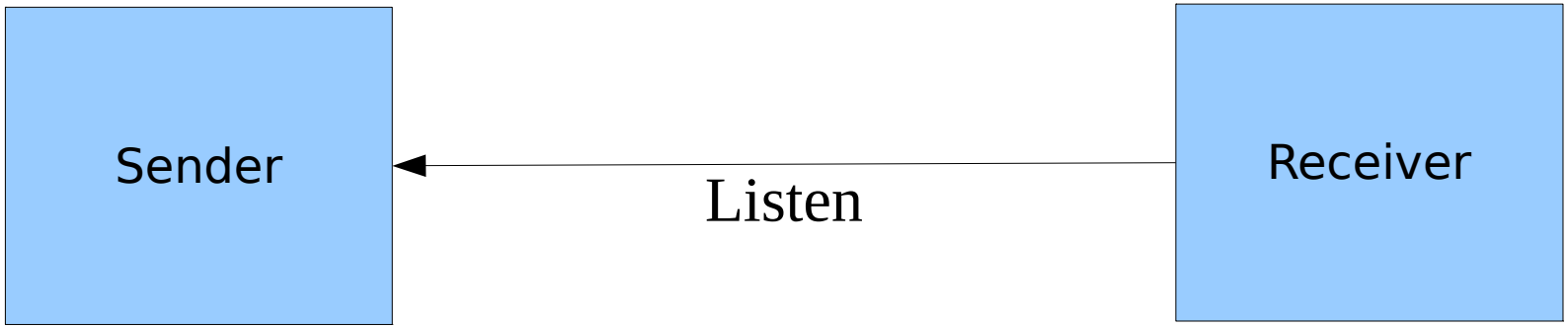
Method Call


```
class A {
   …
   b.someMethod();
   …
}
```

Event

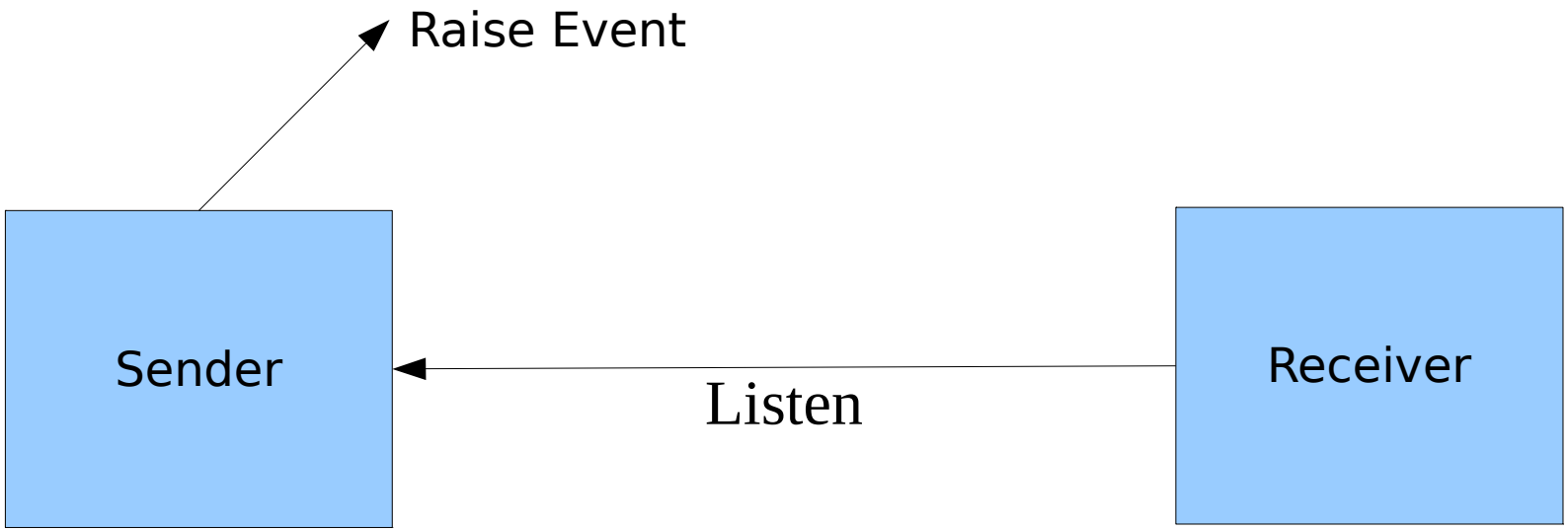


Event



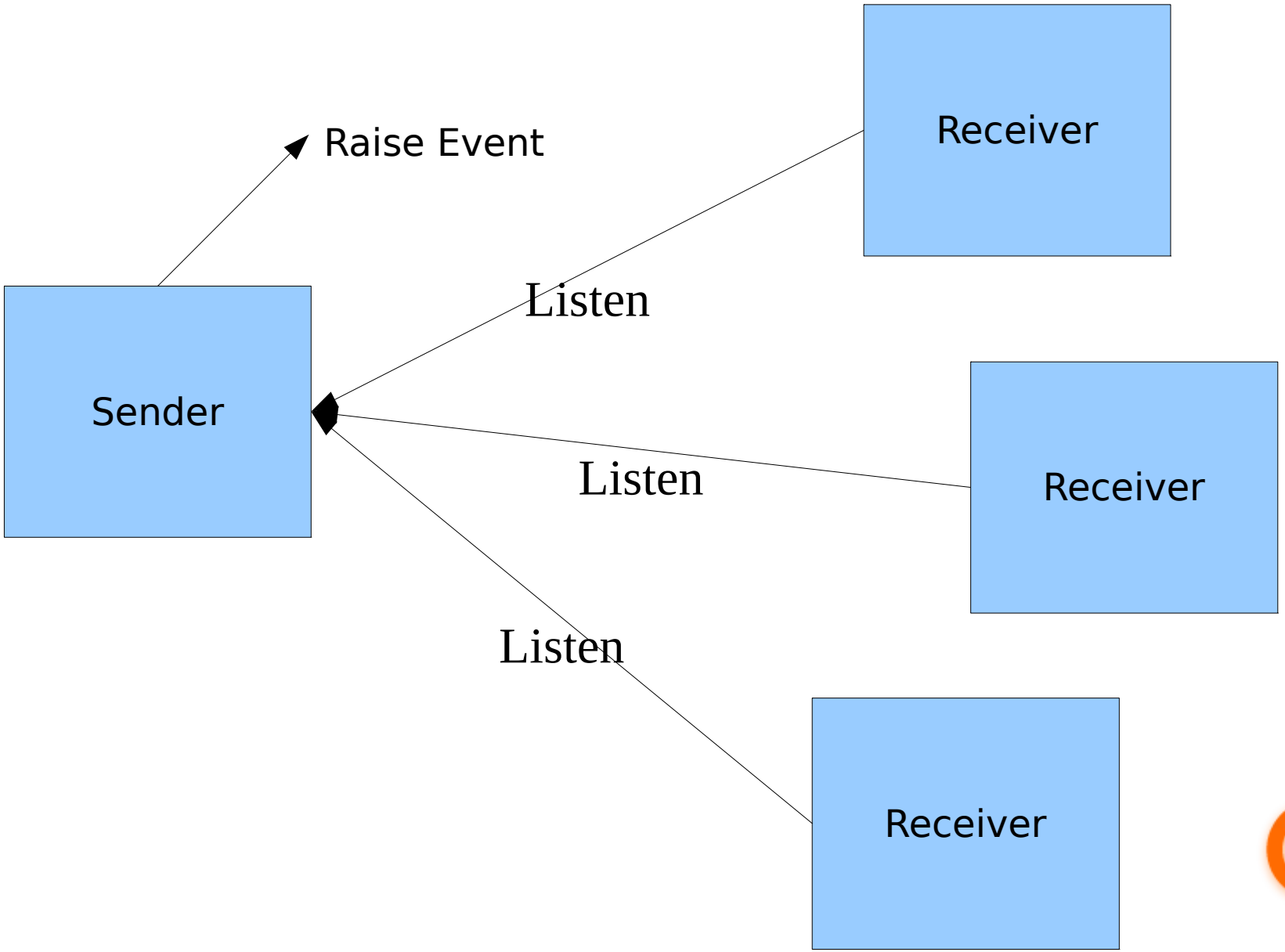

```
a.on('someEvent', b.someMethod);
```

Event




```
a.on('someEvent', b.someMethod);
a.emit('someEvent');
```

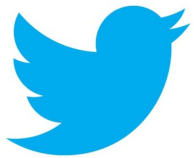
Event


Raise Event
Receiver
Listen
Sender
Receiver
Listen
Listen
Receiver

Method vs. Event

https://www.flickr.com/photos/gen/325927418

VS.

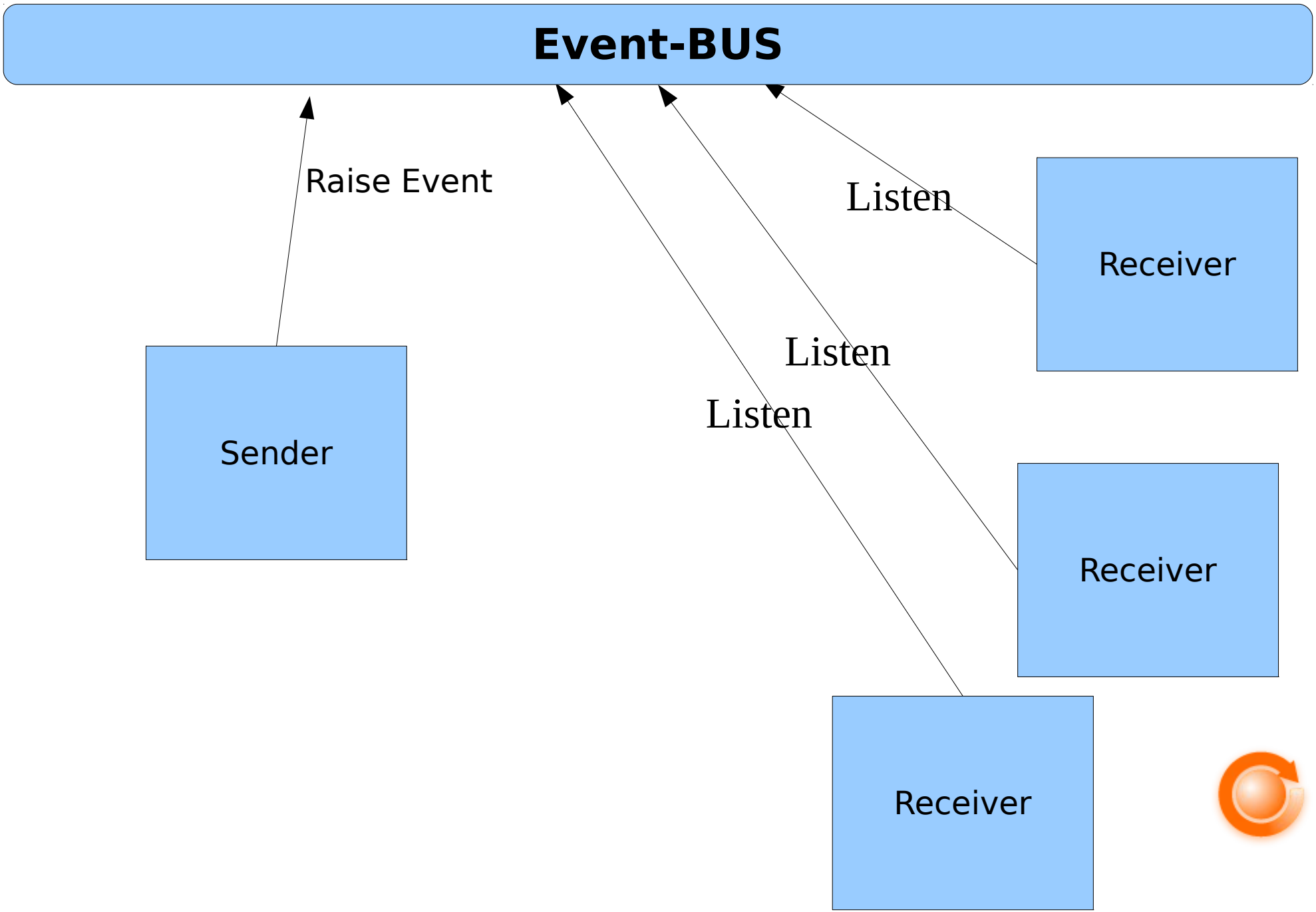


https://www.flickr.com/photos/gen/325927418

Wiring

https://www.flickr.com/photos/caroslines/547184477

Pub/Sub


Event-BUS
Raise Event
Listen
Receiver
Listen
Listen
Sender
Receiver
Receiver

Event vs. Method

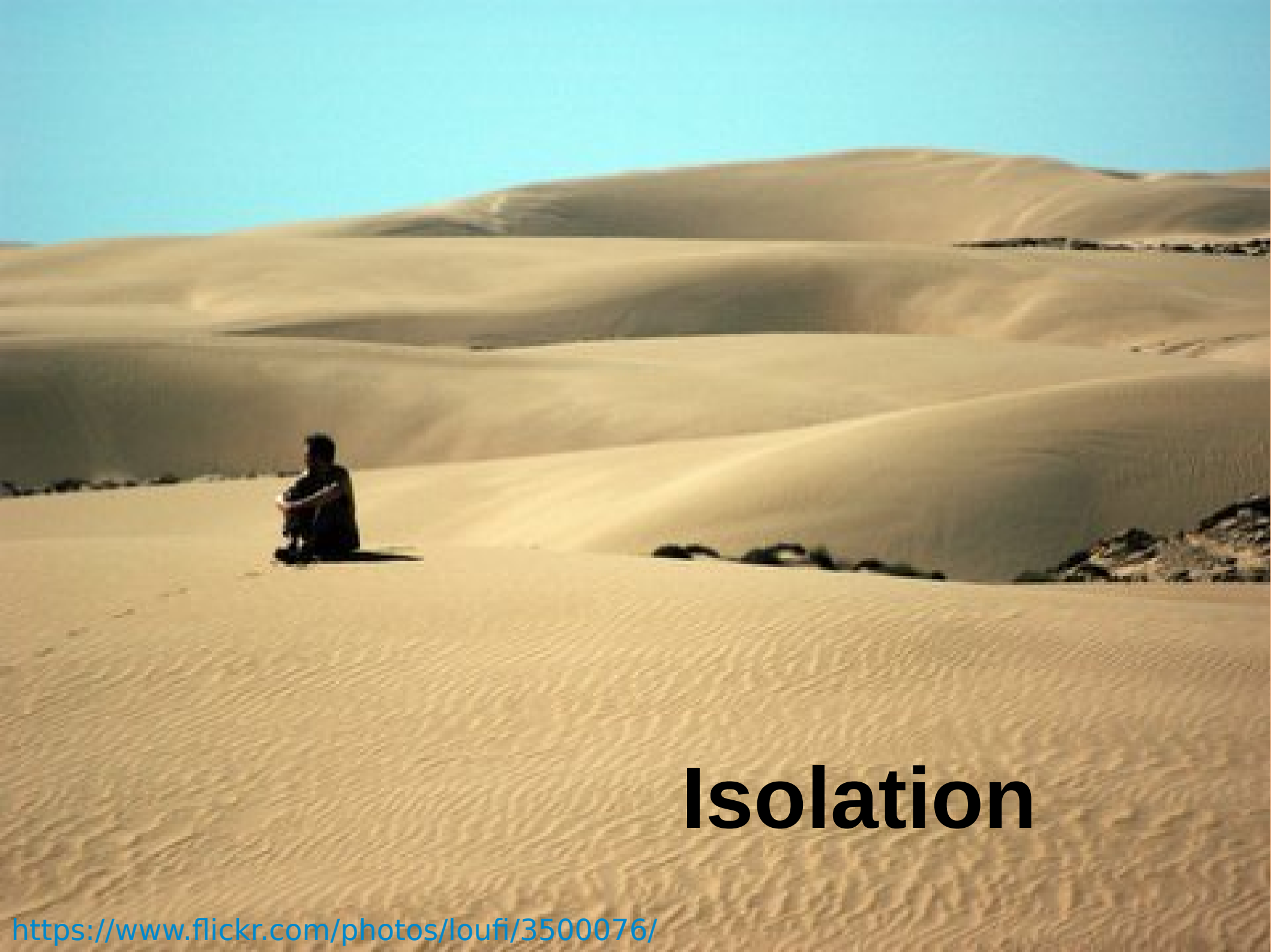
Method

- Sender tells Receiver
- Sync
- Fixed Coupling
- New Receiver: change to Sender

Event

- Receiver listens to Sender
- Sync / Async
- Loose Coupling
- New Receiver: **no** change to Sender
- Sometimes: Hard to Test/Debug


Testing?



https://www.flickr.com/photos/loufi/3500076/

Winner?

https://www.flickr.com/photos/48424574@N07/5096035675

Event Frameworks

https://www.flickr.com/photos/alebaffa/8939535066

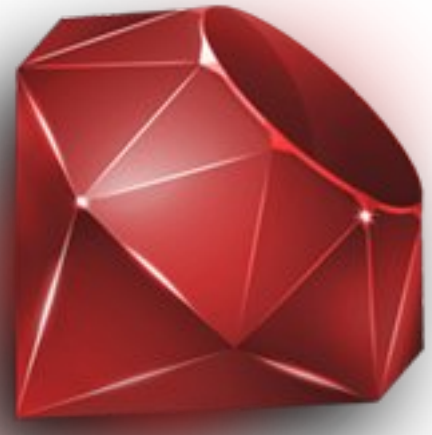
JavaScript / Node.JS

http://nodejs.org/api/events.html

JavaScript / Browser

https://github.com/asyncly/EventEmitter2

Ruby



https://github.com/jcoglan/eventful

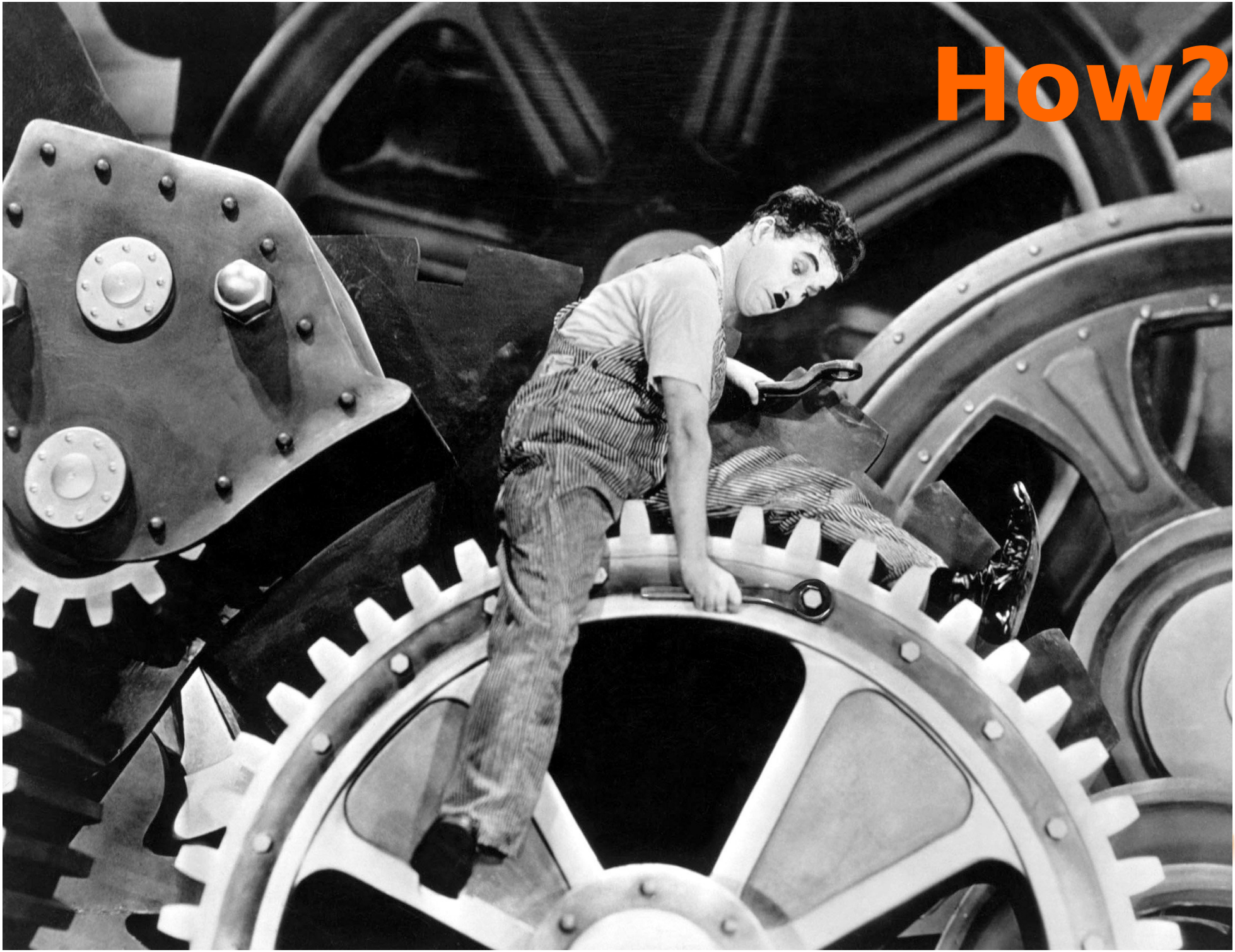
gem install eventful

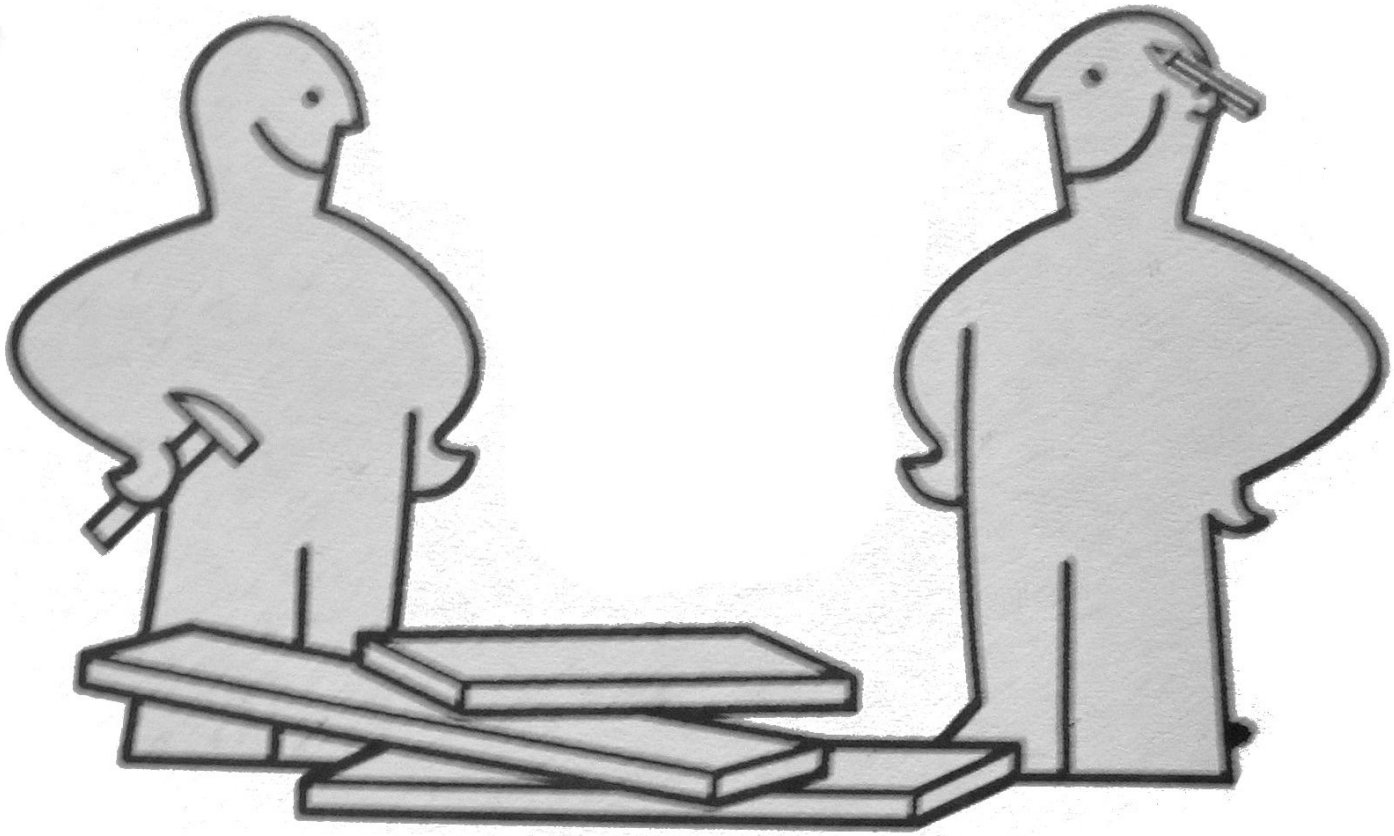
Java

java.util.EventListener

Or

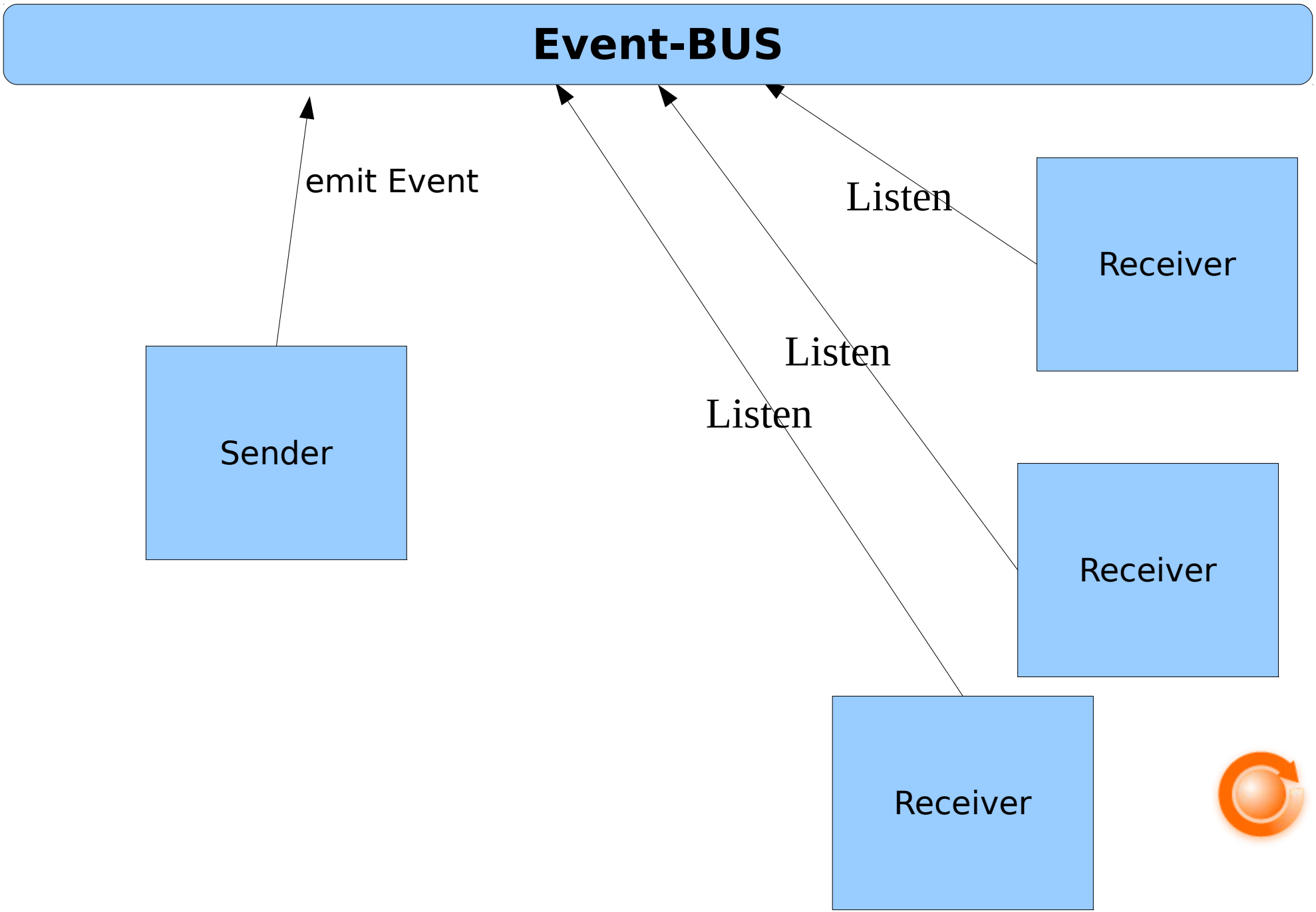
ticino - events, not elephants
https://github.com/micwin/ticino


How?

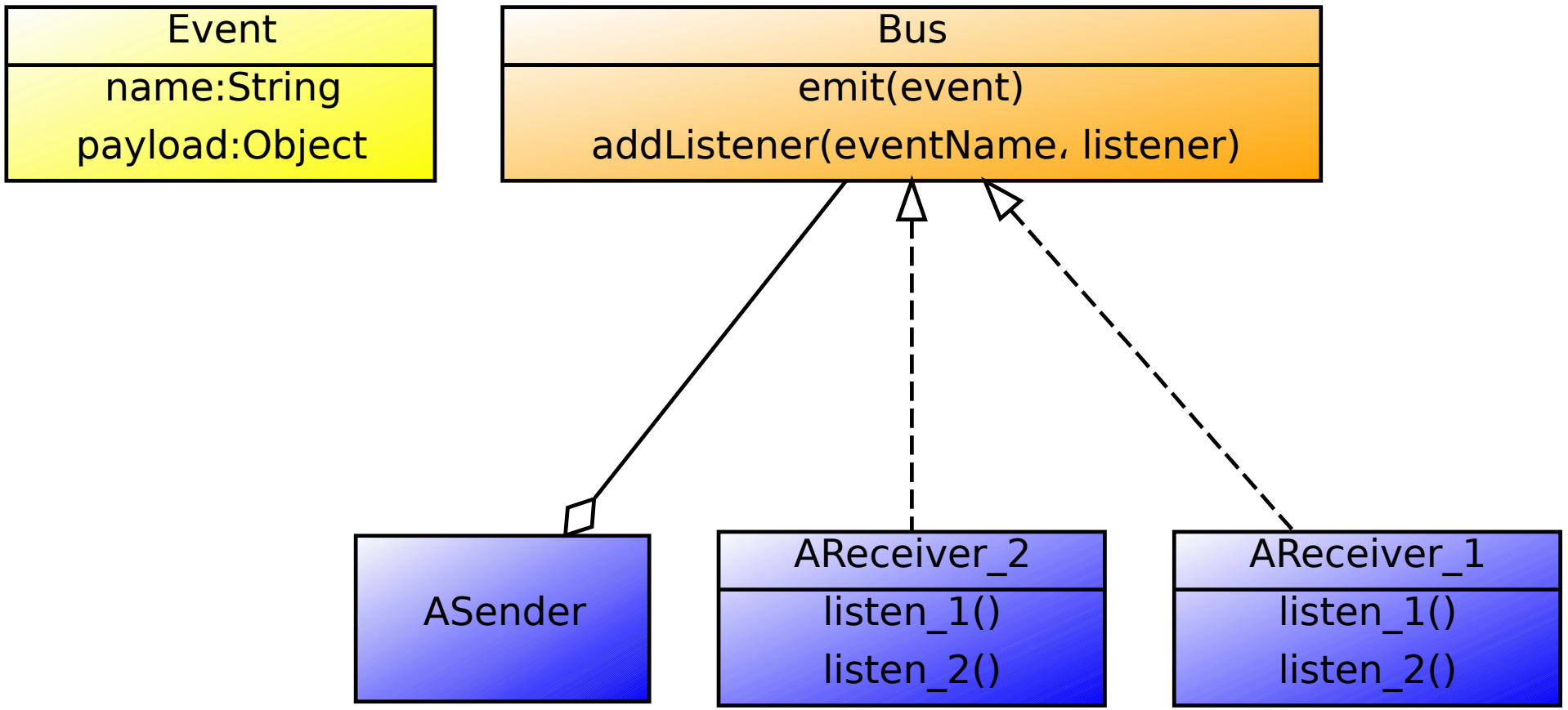


Do It Yourself

Pub/Sub


Event-BUS
emit Event
Listen
Receiver
Listen
Sender
Listen
Receiver
Receiver

Minimal EventFramework (JS)



Basics (JS)

```
var callback1 = function() { … }
var callback2 = function() { … }


bus.addListener('SomethingHappened', callback1);
bus.addListener('SomethingHappened', callback2);
bus.emit('SomethingHappened');
```

Payload (JS)

```
var callback = function(payload) {
  ...
});

bus.addListener('SomethingHappened', callback);

bus.emit('SomethingHappened', {bar: 'foo'});
```

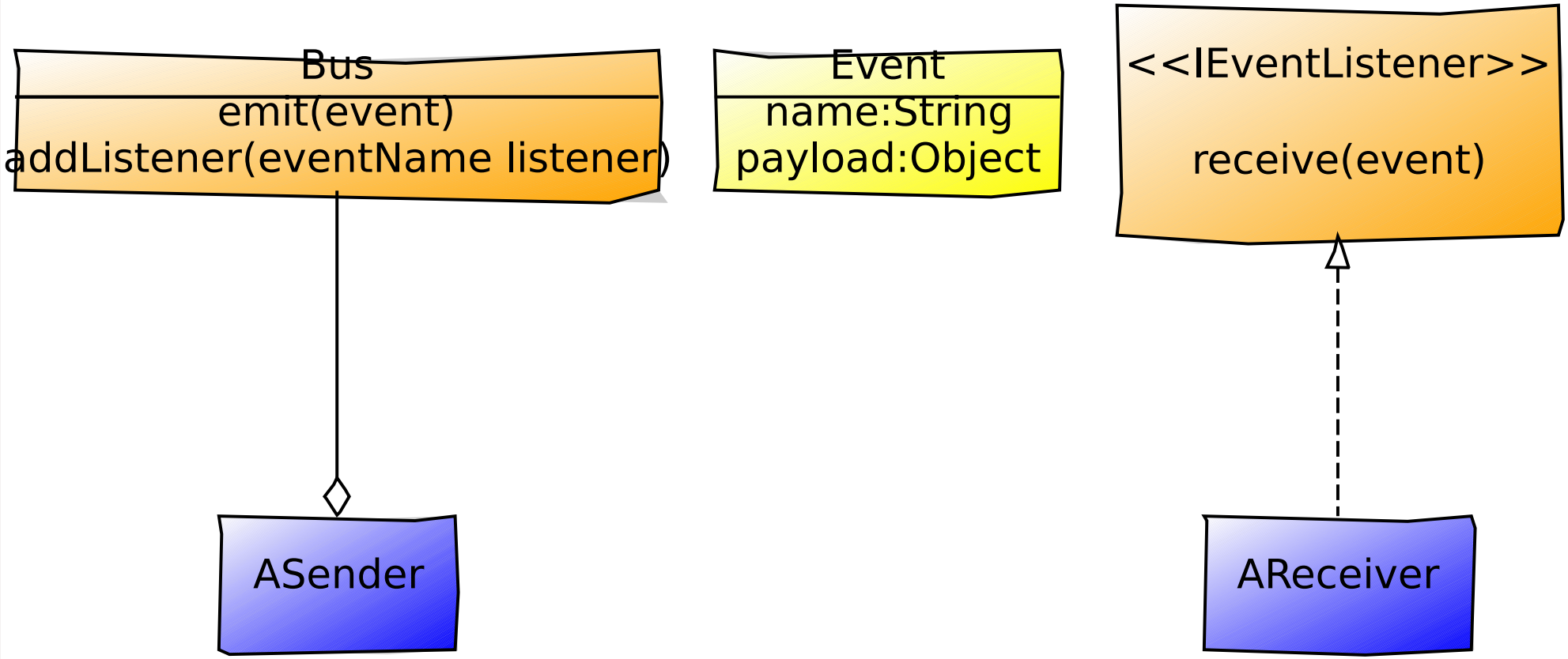
Payload (JS)

```
var callback = function(payload) {
  ...
});

bus.addListener('SomethingHappened', callback);

bus.emit('SomethingHappened', {bar: 'foo'});
```

Minimal EventFramework (Java)



Basics (Java)

```
public class ReceiverDemo implements EventListener {
   public void receive(Event event) {}
…
}

EventBus bus = new EventBus();
ReceiverDemo receiver1 = new ReceiverDemo();
ReceiverDemo receiver2 = new ReceiverDemo();

bus.addListener("SomethingHappened", receiver1);
bus.addListener("SomethingHappened", receiver2);
bus.emit(new Event("SomethingHappened"));
```

Payload (Java)

```
public class ReceiverDemo implements EventListener {
   public void receive(Event event) {}
…
}
```

```
int payload = 27;
EventBus bus = new EventBus();
ReceiverDemo receiver1 = new ReceiverDemo();

bus.addListener("SomethingHappened", receiver1);
bus.emit(new Event("SomethingHappened", payload));
```

Tests/Specs

1) a_Bus_can_emit_Events

2) a_Receiver_gets_notified

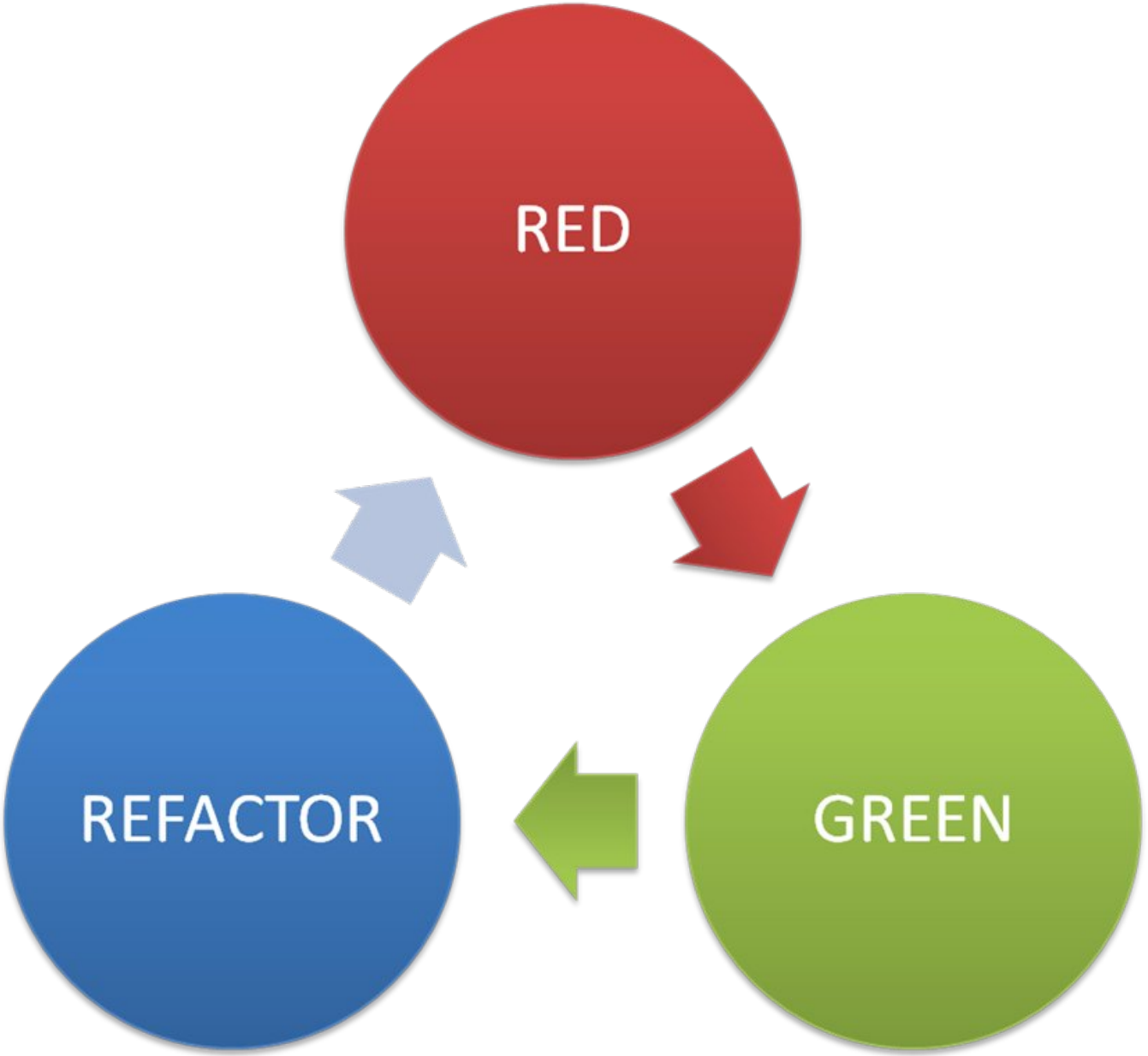
3) multiple_Receivers_get_notified

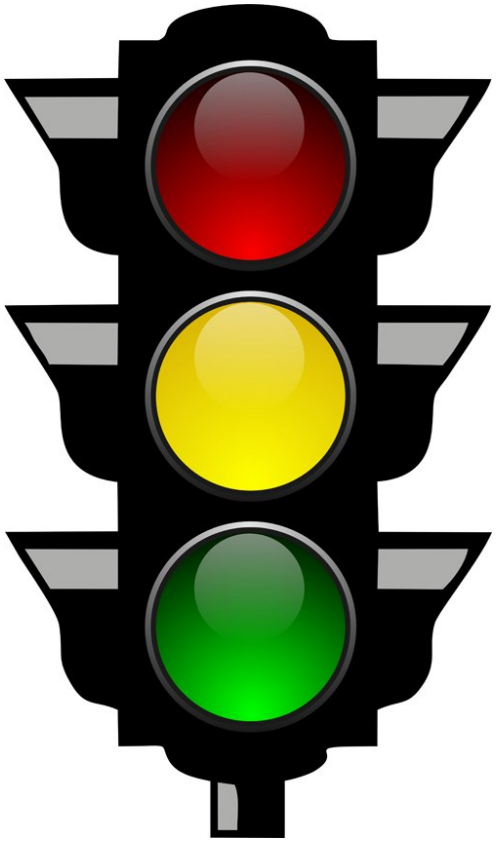
4) Events_accept_a_Payload

Practice

https://www.youtube.com/watch?v=8wUOUmeulNs

Pair-Programming





TDD

USE

JSBin + Jasmine
http://bit.ly/1RPMOYv

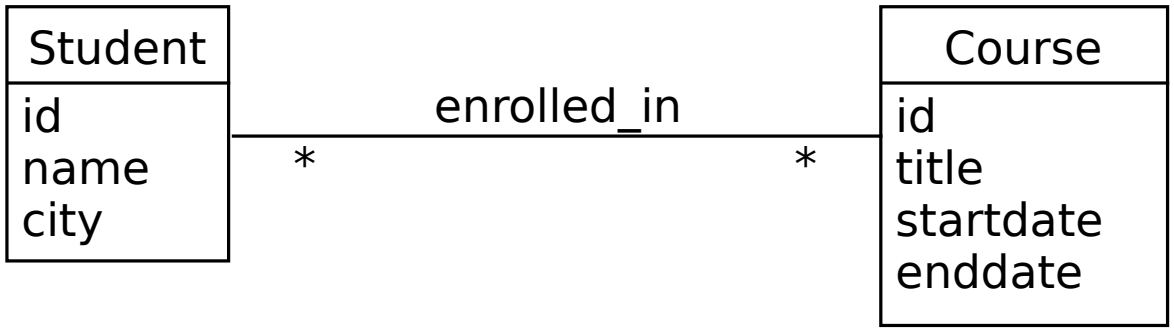
OR

Language +
Test/Spec Framework of your Choice

GO

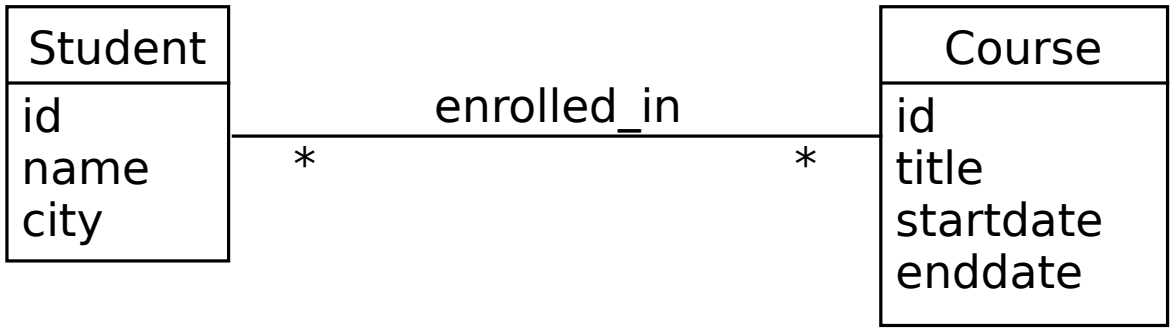
Persistence

Enrollment

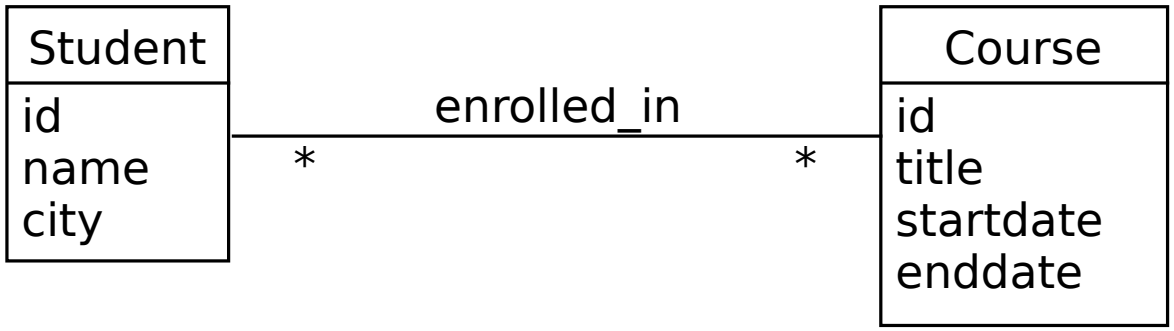



```
function enroll(student, course) {
  …
}
```

ORM / CRUD

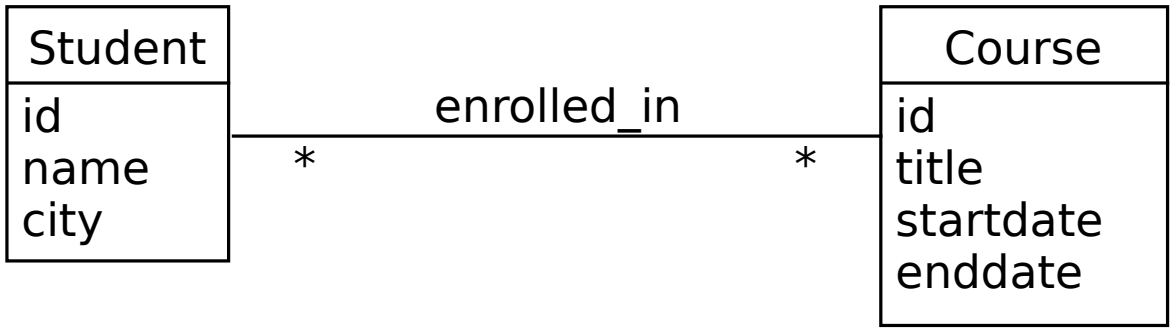

Student
id
name
city
enrolled_in
*
*
Course
id
title
startdate
enddate

ORM



id	name	city
1	Peter	Nürnberg
2	Chris	Hamburg
3	Steffen	München

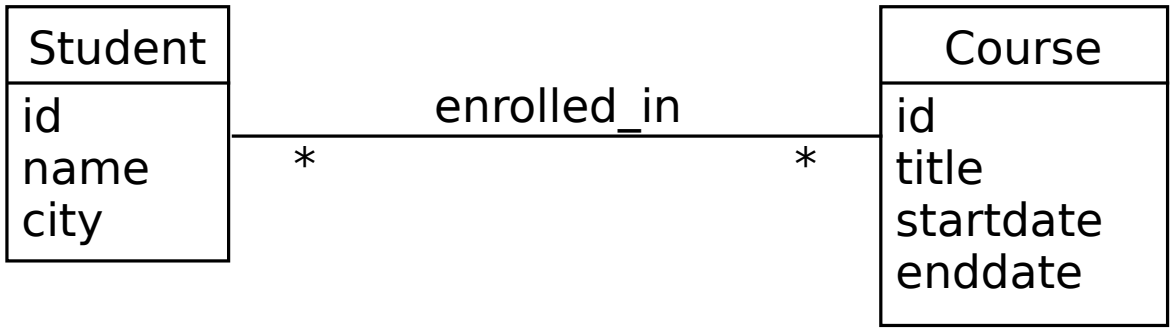
ORM



id	name	city
1	Peter	Nürnberg
2	Chris	Hamburg
3	Steffen	München

id	title	startdate
1	ES6	21.07.2015
2	TDD	07.08.2015

ORM

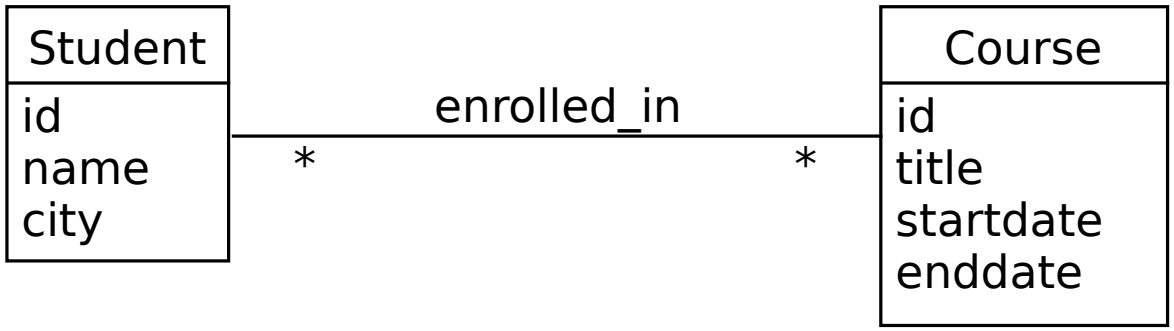


id	name	city
1	Peter	Nürnberg
2	Chris	Hamburg
3	Steffen	München

id	title	startdate
1	ES6	21.07.2015
2	TDD	07.08.2015

student_id	course_id

ORM

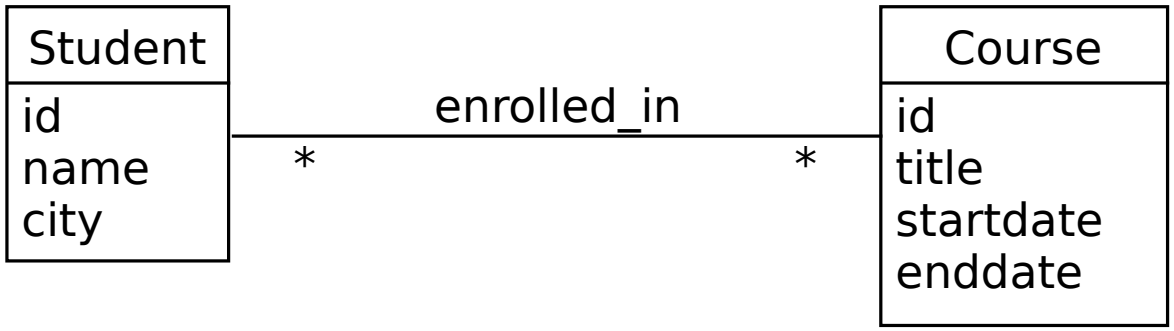


id	name	city
1	Peter	Nürnberg
2	Chris	Hamburg
3	Steffen	München

id	title	startdate
1	ES6	21.07.2015
2	TDD	07.08.2015

student_id	course_id
1	1

ORM



id	name	city
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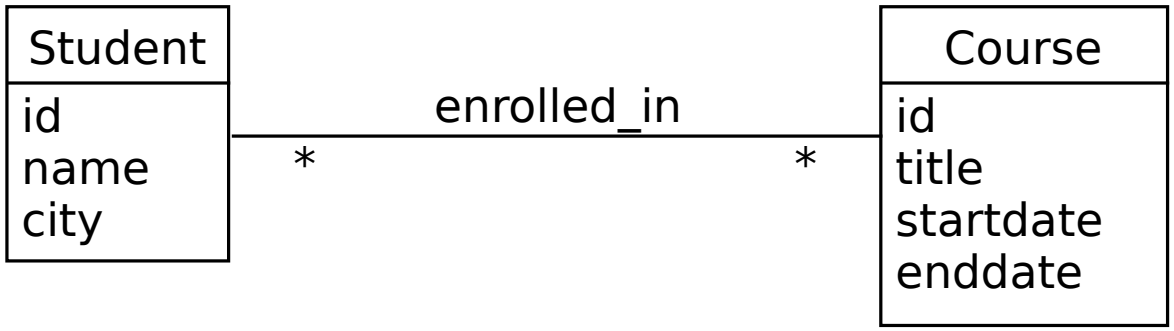
2	Chris	Hamburg
3	Steffen	München

id	title	startdate
1	ES6	21.07.2015
2	TDD	07.08.2015

student_id	course_id
1	1
2	1

ORM



id	name	city
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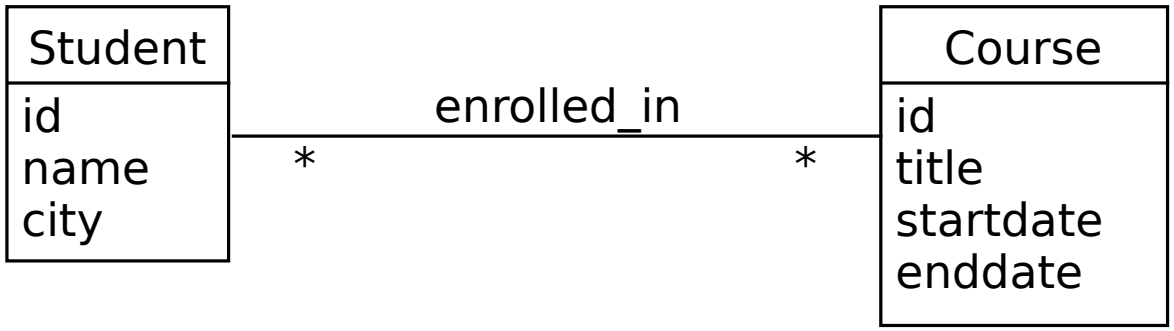
2	Chris	Hamburg
3	Steffen	München

id	title	startdate
1	ES6	21.07.2015
2	TDD	07.08.2015

student_id	course_id
1	1
2	1

ORM



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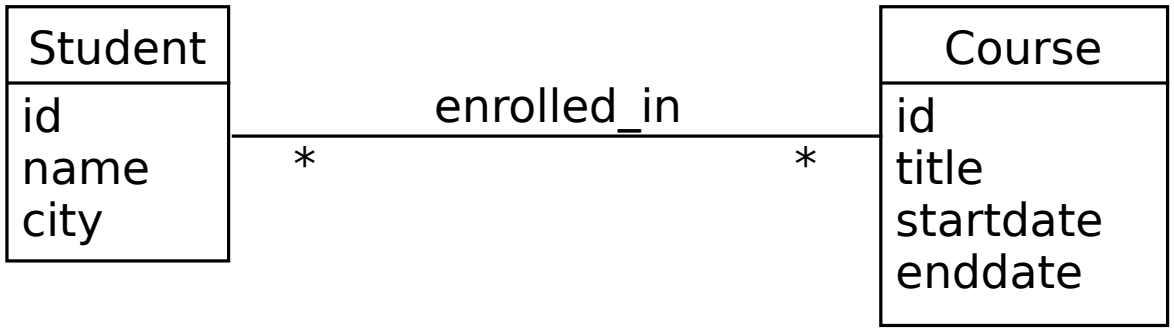
2	Chris	Hamburg
3	Steffen	München

id	title	startdate
1	ES6	21.07.2015
2	TDD	07.08.2015

student_id	course_id
2	1

ORM



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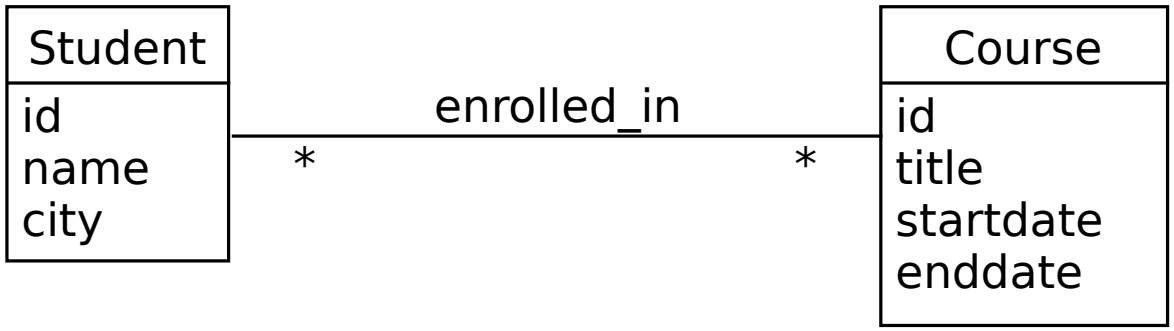
2	Chris	Hamburg
3	Steffen	München

id	title	startdate
1	ES6	21.07.2015
2	TDD	07.08.2015

student_id	course_id
2	1
2	2

ORM



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2	Chris	Hamburg
3	Steffen	München

id	title	startdate
1	ES6	21.07.2015
2	TDD	07.08.2015

student_id	course_id
2	1
2	2
3	1

New Feature

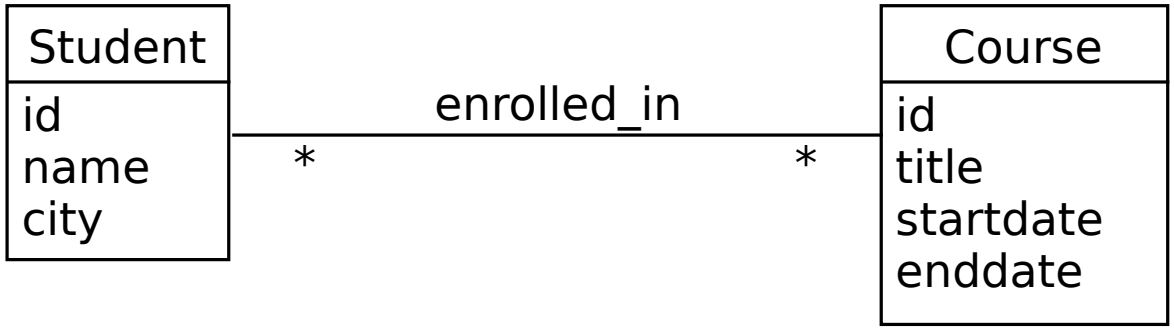
New Feature

Number of Cancelations?

Event Sourcing

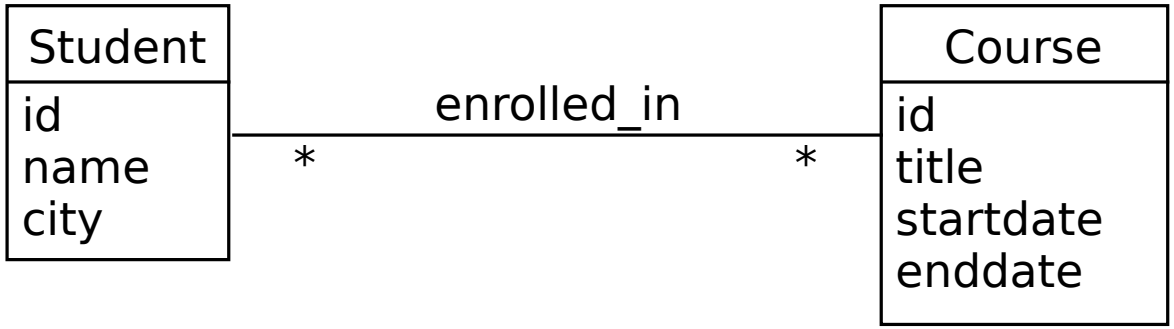
https://www.igbce.de/tarife/tarifrunden/8344/kvi-erfurt-2012
Foto: Srebrina Yaneva

Event Sourcing



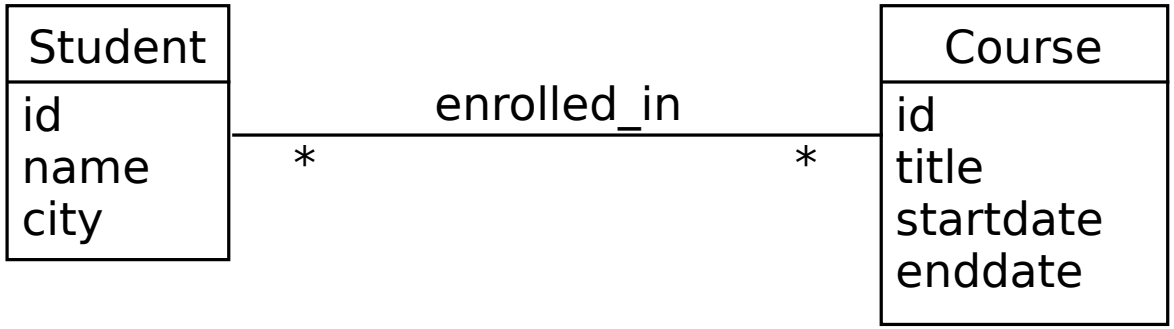
uuid	EventName	Timestamp	Payload (serialized)

Event Sourcing



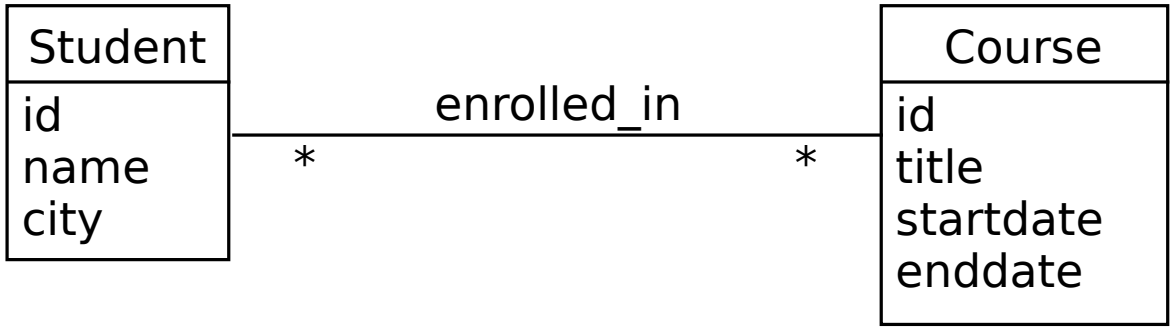
uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1

Event Sourcing



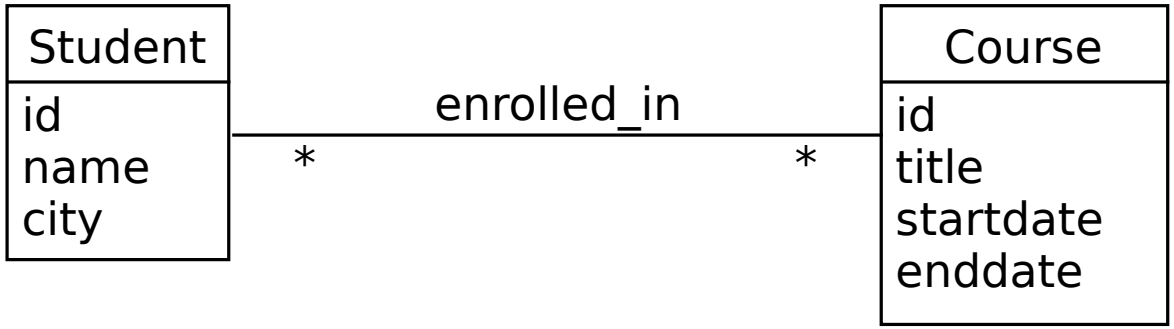
uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1
2	StudentCreated		name: Chris, city: Hamburg, uuid: 2

Event Sourcing



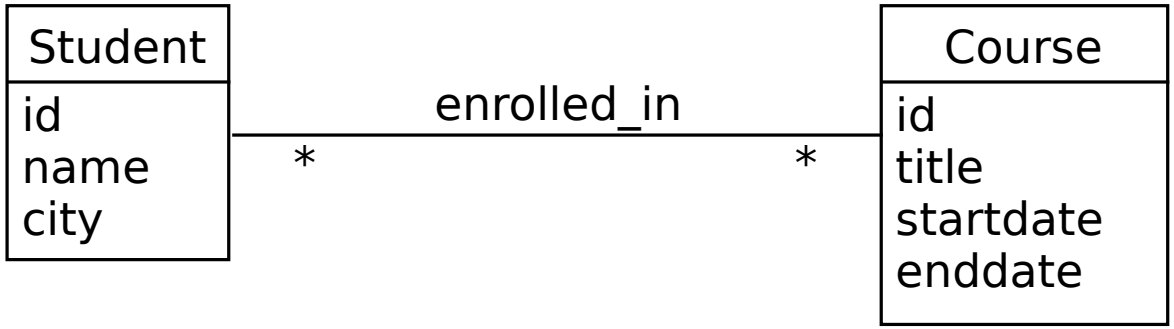
uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1
2	StudentCreated		name: Chris, city: Hamburg, uuid: 2
3	StudentCreated		name: Steffen, city: München, uuid: 3

Event Sourcing



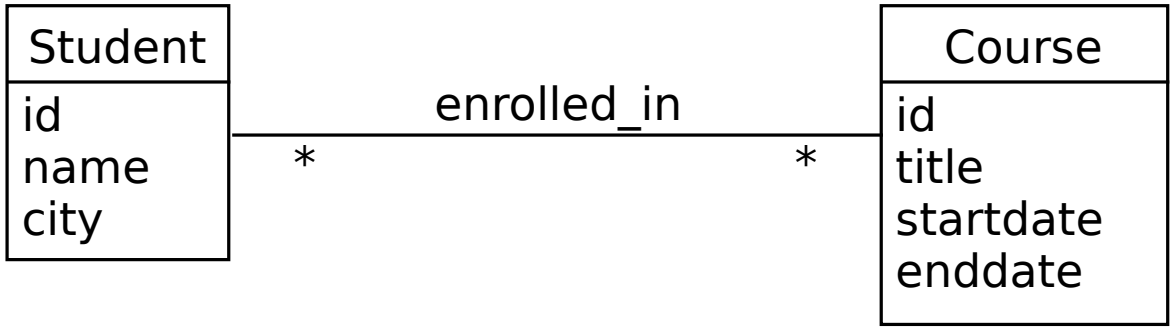
uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1
2	StudentCreated		name: Chris, city: Hamburg, uuid: 2
3	StudentCreated		name: Steffen, city: München, uuid: 3
4	CourseCreated		name: ES6, startdate: 27.01.2015

Event Sourcing



uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1
2	StudentCreated		name: Chris, city: Hamburg, uuid: 2
3	StudentCreated		name: Steffen, city: München, uuid: 3
4	CourseCreated		name: ES6, startdate: 27.01.2015
5	StudentEnrolled		student_uuid: 1, course_uuid: 1

Event Sourcing



uuid	EventName	Timestamp	Payload (serialized)
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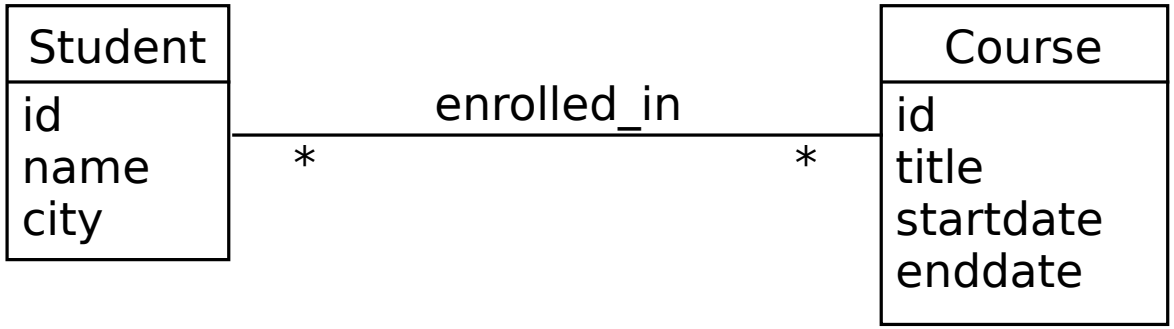
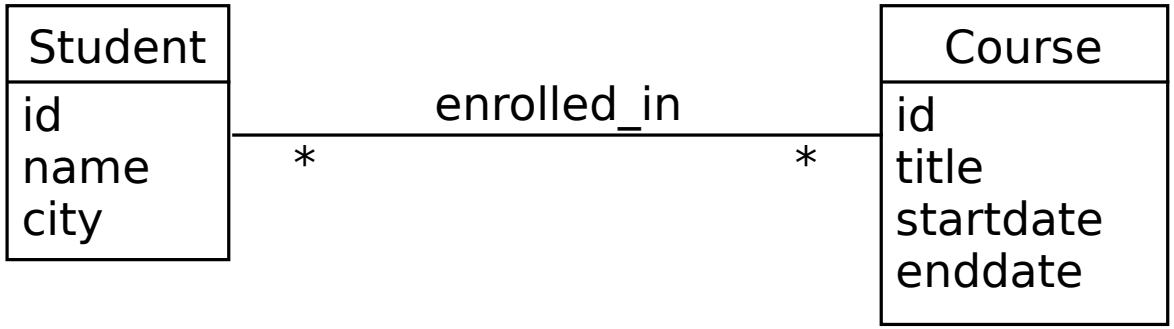
2	StudentCreated		name: Chris, city: Hamburg, uuid: 2
3	StudentCreated		name: Steffen, city: München, uuid: 3
4	CourseCreated		name: ES6, startdate: 27.01.2015
5	StudentEnrolled		student_uuid: 1, course_uuid: 1
6	StudentEnrolled		student_uuid: 2, course_uuid: 1

Event Sourcing



uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1
2	StudentCreated		name: Chris, city: Hamburg, uuid: 2
3	StudentCreated		name: Steffen, city: München, uuid: 3
4	CourseCreated		name: ES6, startdate: 27.01.2015
5	StudentEnrolled		student_uuid: 1, course_uuid: 1
6	StudentEnrolled		student_uuid: 2, course_uuid: 1
7	StudentCanceledCourse		student_uuid: 1, course_uuid: 1

Event Sourcing



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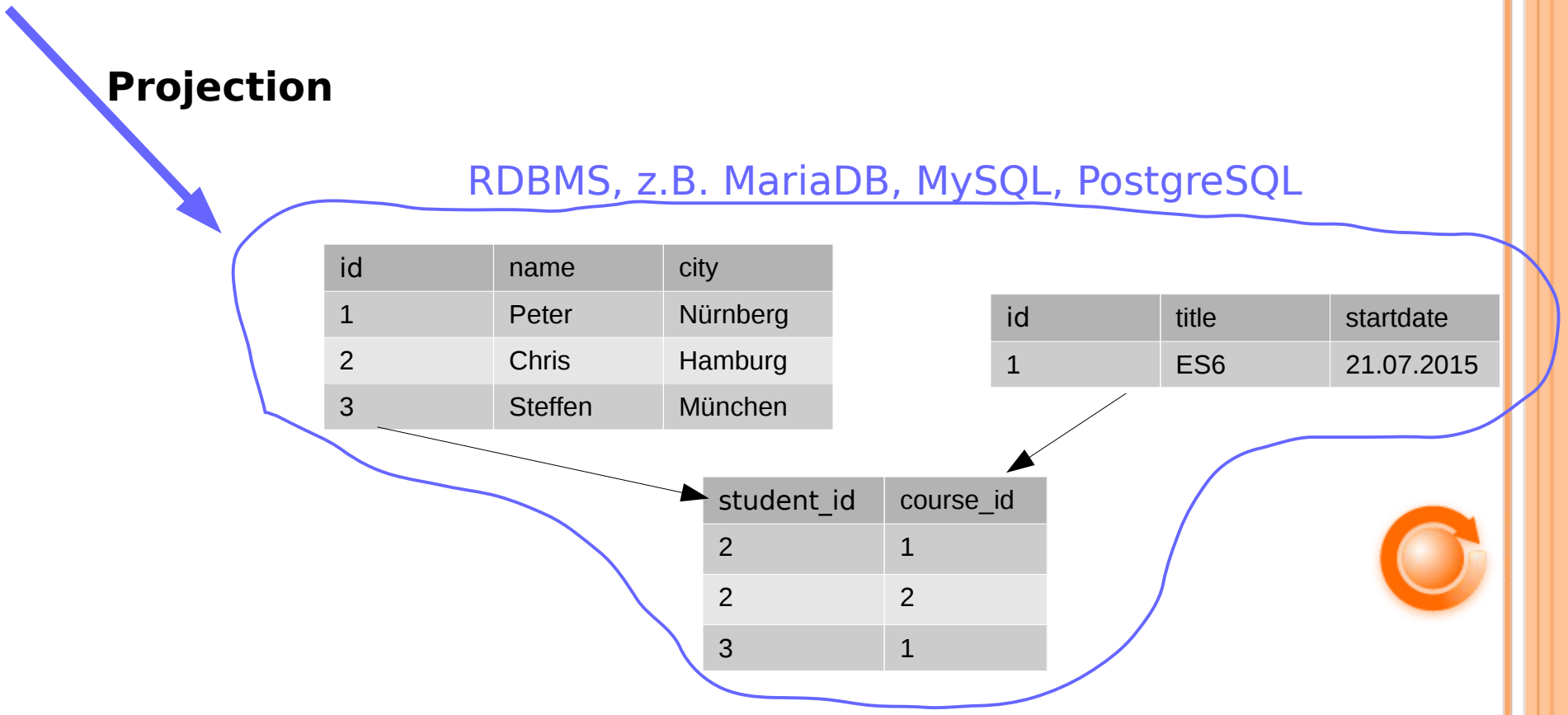
2	StudentCreated		name: Chris, city: Hamburg, uuid: 2
3	StudentCreated		name: Steffen, city: München, uuid: 3
4	CourseCreated		name: ES6, startdate: 27.01.2015
5	StudentEnrolled		student_uuid: 1, course_uuid: 1
6	StudentEnrolled		student_uuid: 2, course_uuid: 1
7	StudentCanceledCourse		student_uuid: 1, course_uuid: 1
8	StudentEnrolled		student_uuid: 2, course_uuid: 2
9	StudentEnrolled		student_uuid: 3, course_uuid: 1
...	...	...	...

Projections

https://www.flickr.com/photos/chrisjagers/5001661139/in/photolist-8C2UPU-8BYPAT
CC Chris Jager

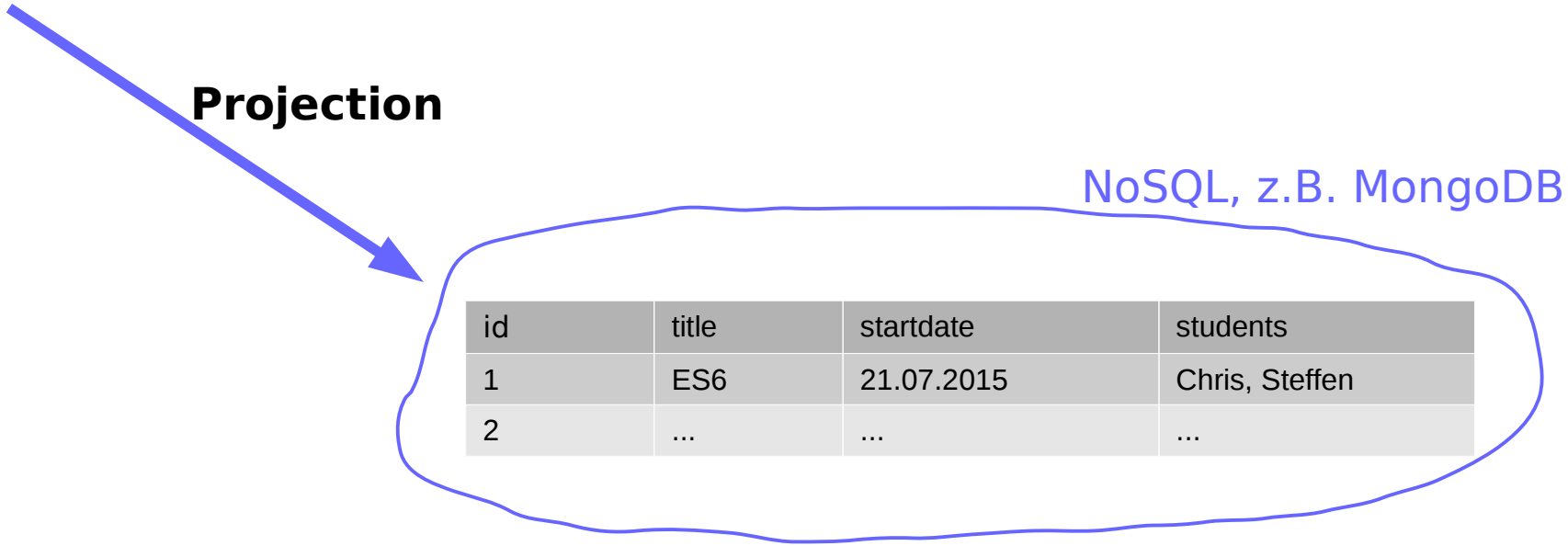
Projections

uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1
…	…	…	…
9	StudentEnrolled		student_uuid: 3, course_uuid: 1
...	...	...	...



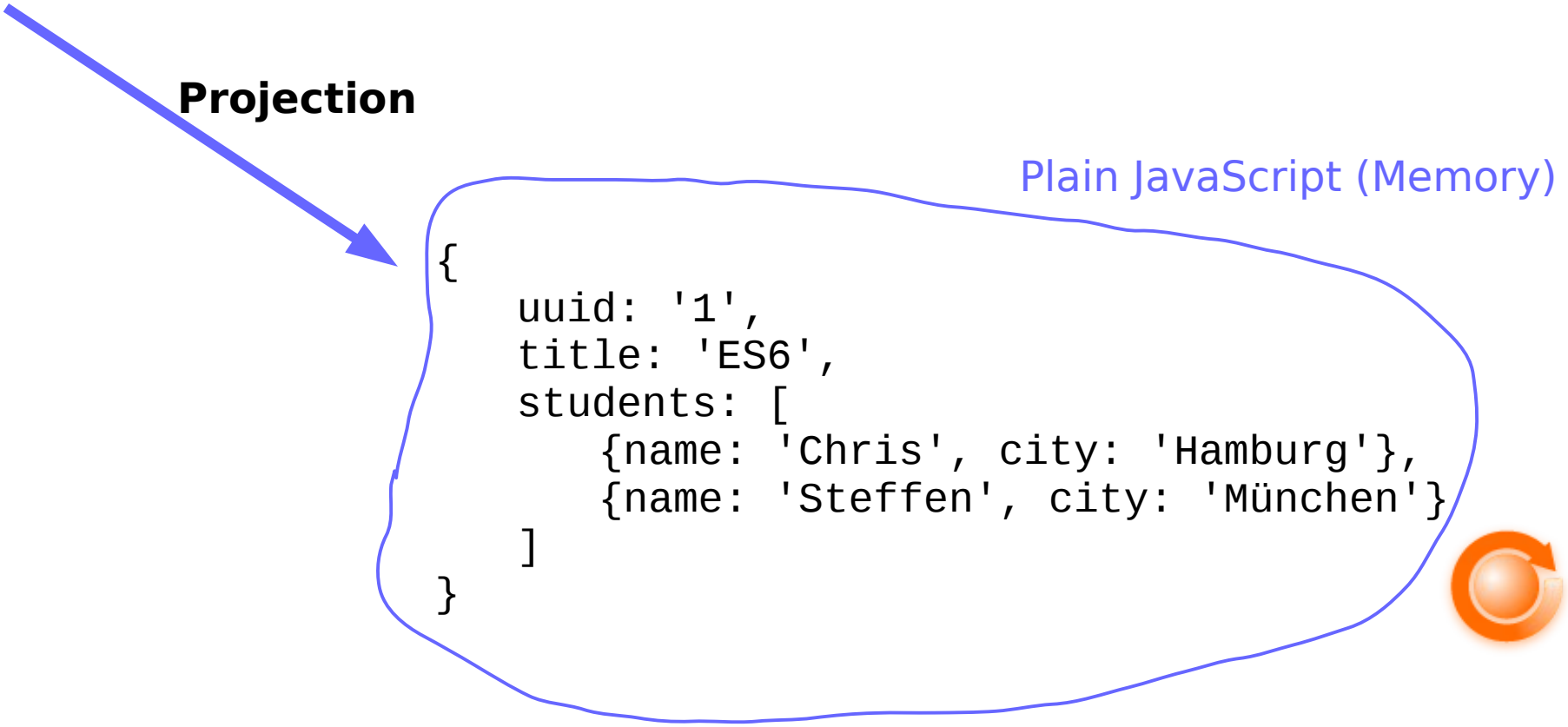
Projections

uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1
…	…	…	…
9	StudentEnrolled		student_uuid: 3, course_uuid: 1
...	...	...	...



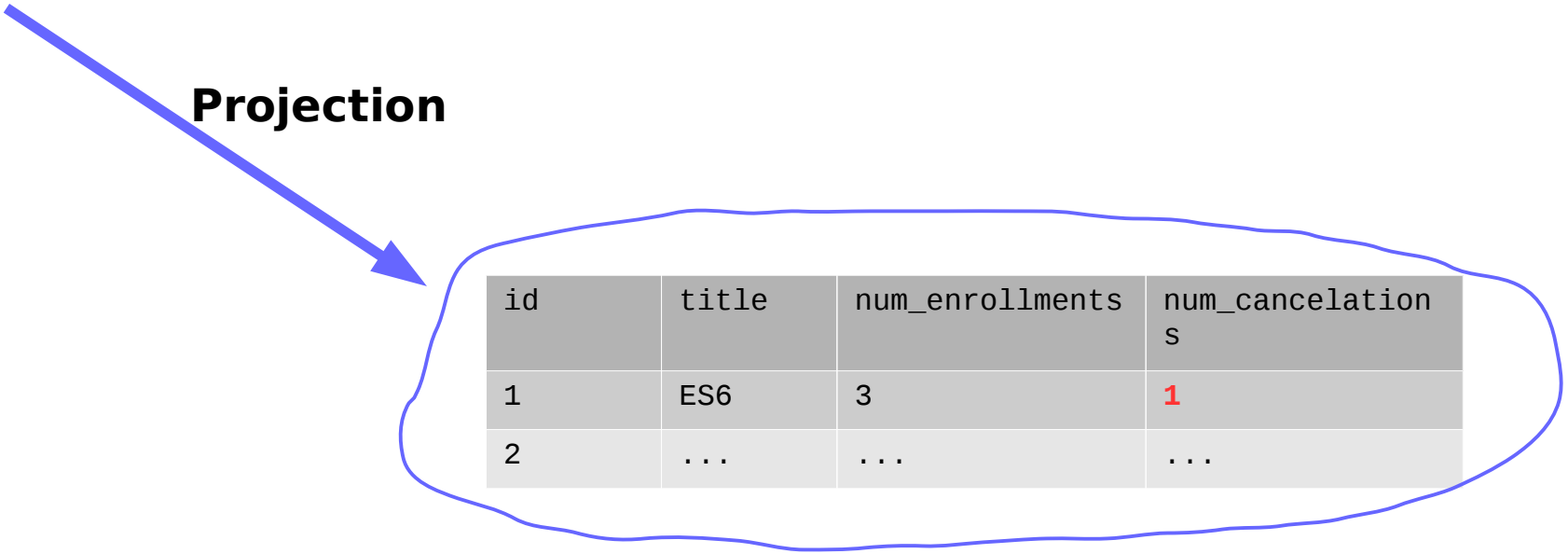
Projections

uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1
…	…	…	…
9	StudentEnrolled		student_uuid: 3, course_uuid: 1
...	...	...	...



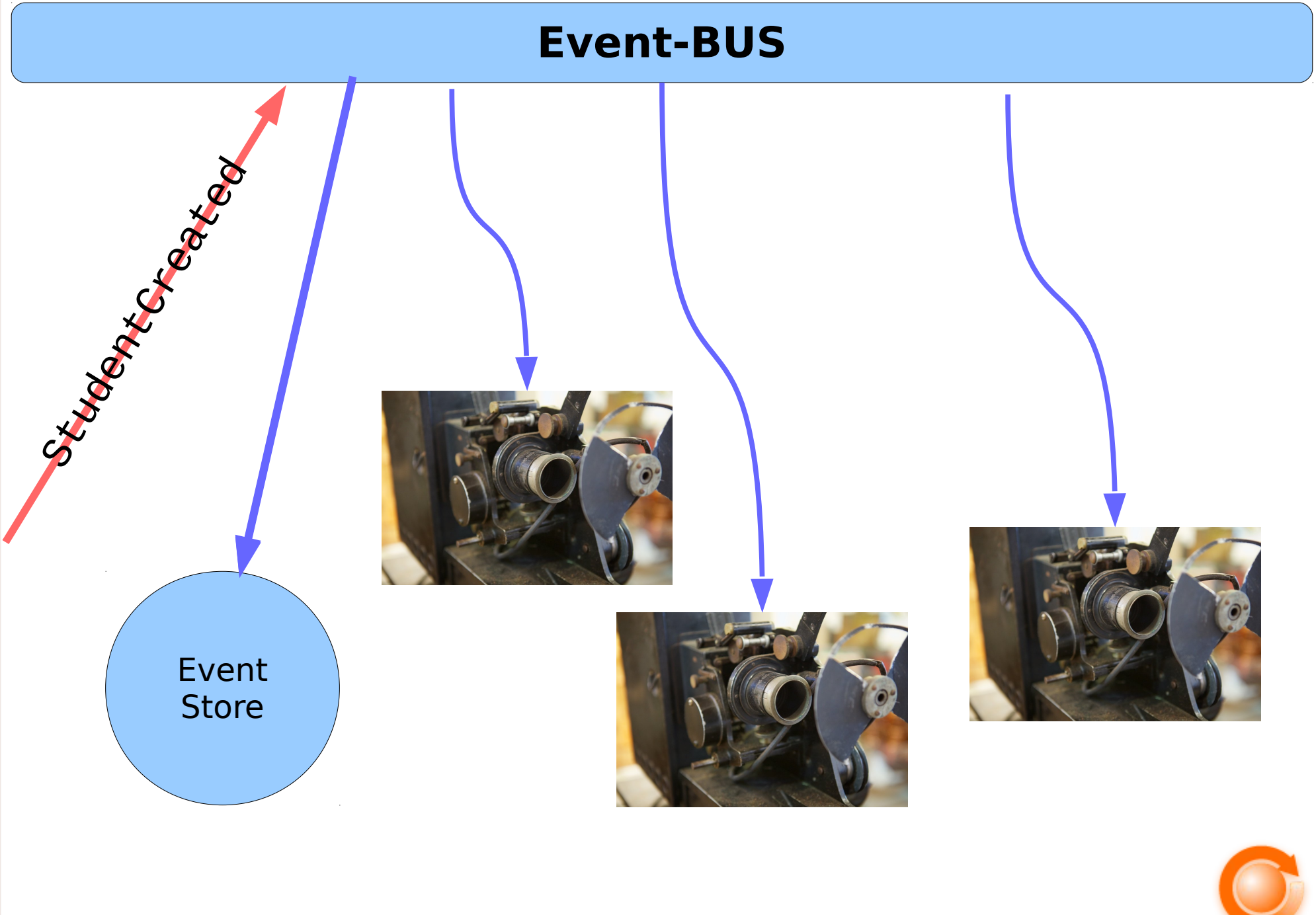
Projections

uuid	EventName	Timestamp	Payload (serialized)
1	StudentCreated		name: Peter, city: Nuremberg, uuid: 1
…	…	…	…
9	StudentEnrolled		student_uuid: 3, course_uuid: 1
...	...	...	...

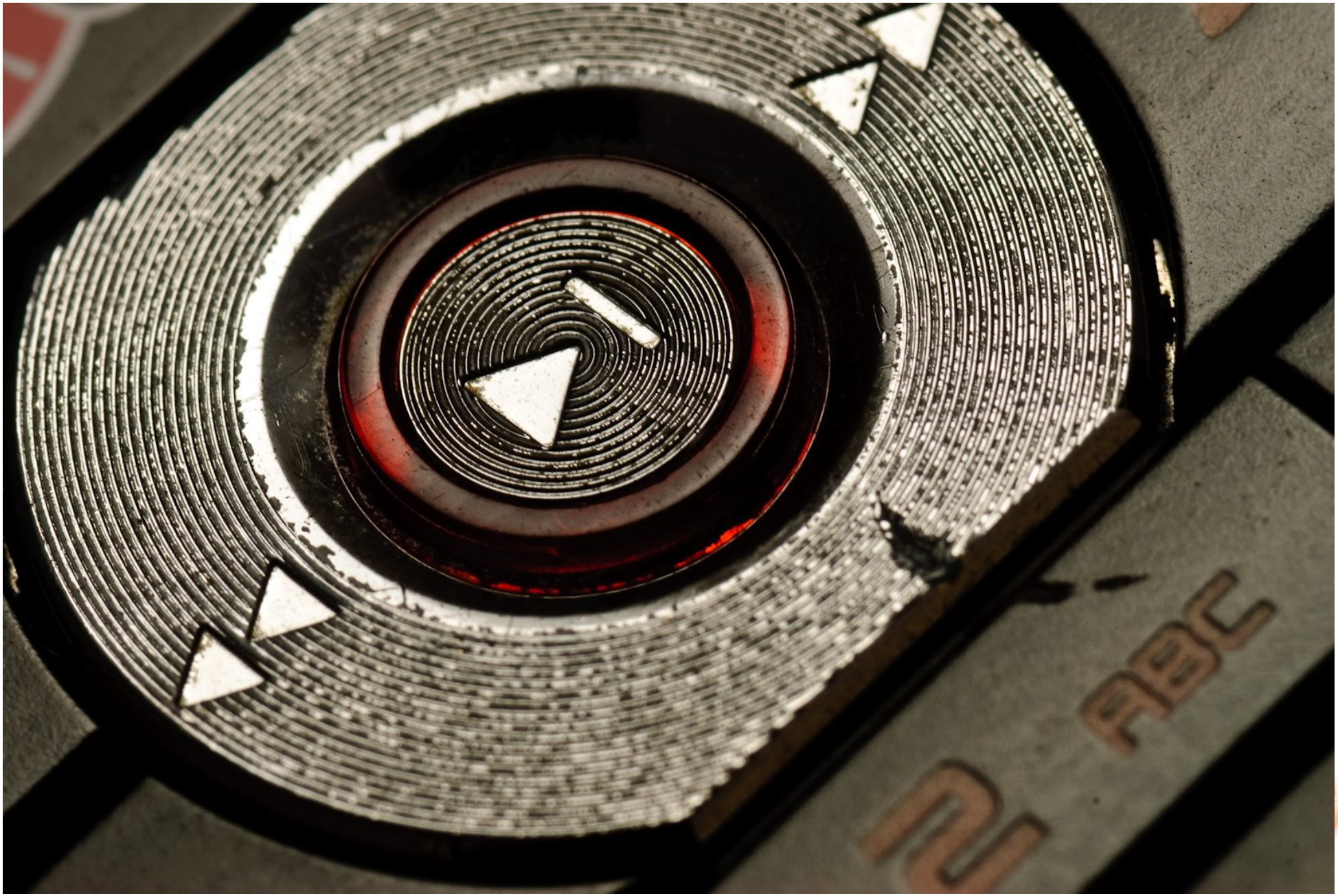


Wiring

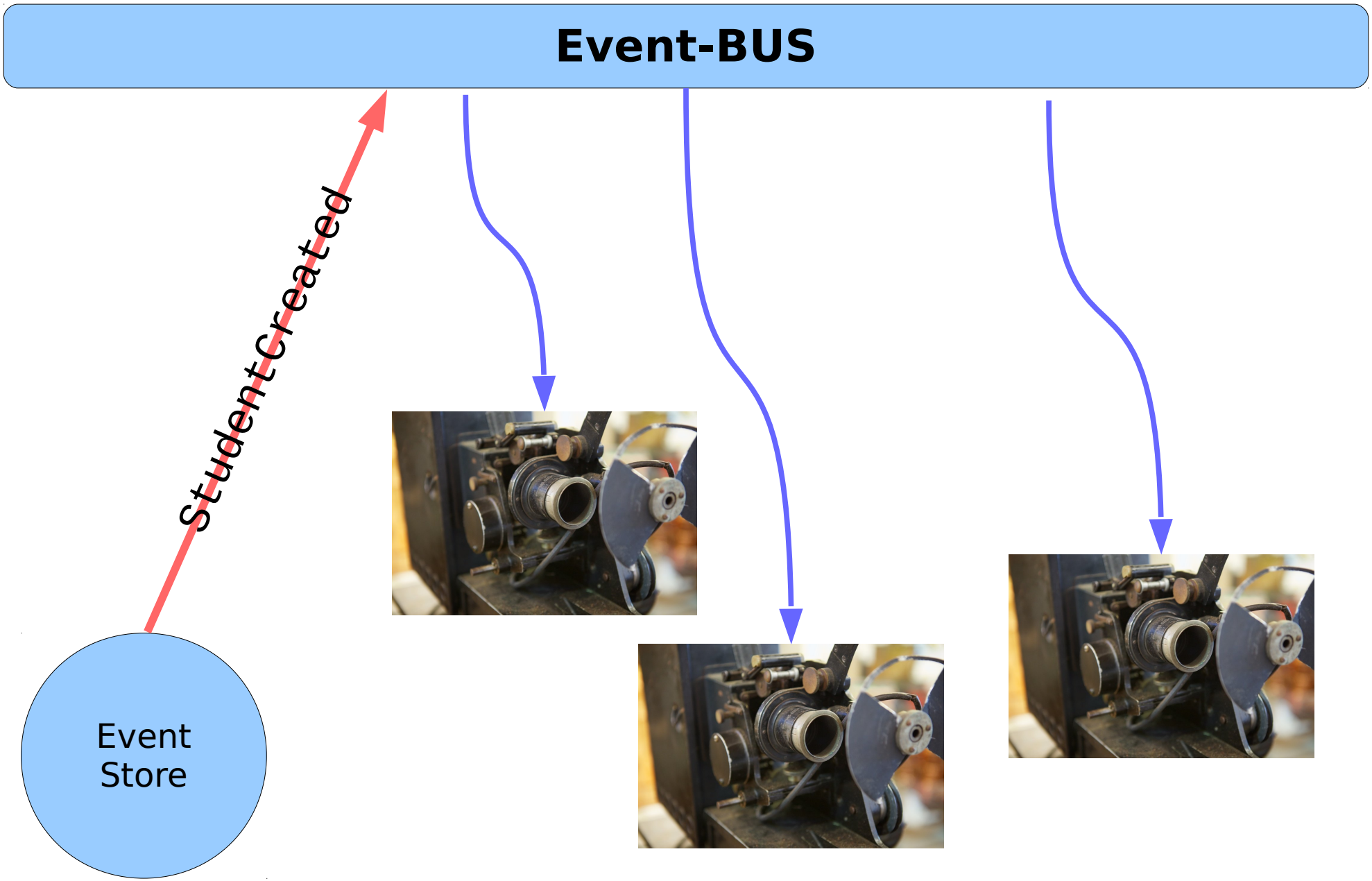
https://www.flickr.com/photos/caroslines/547184477

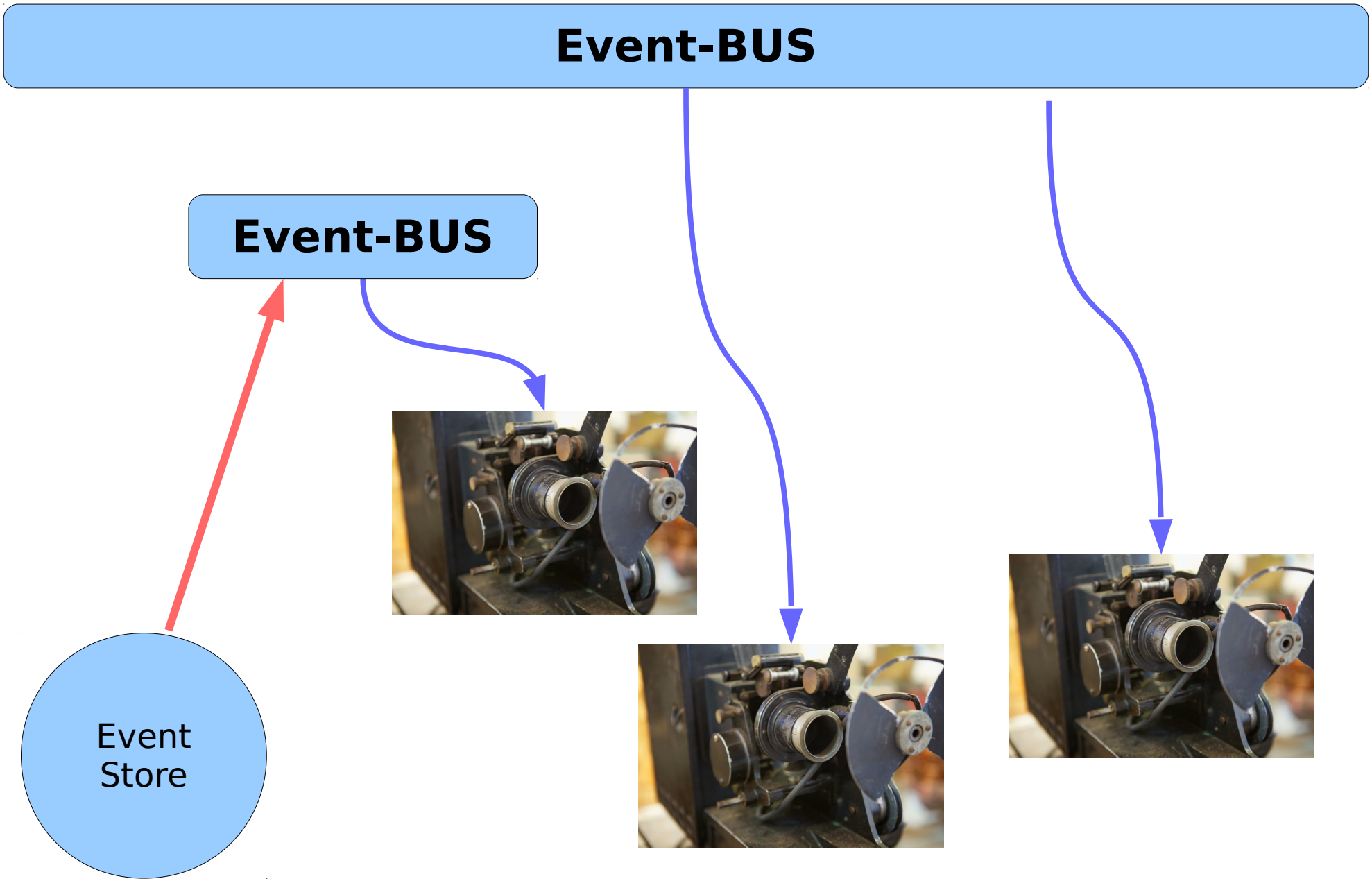

Event-BUS
StudentCreated
Event
Store

Replay



https://www.flickr.com/photos/almostinfamous/4209608094


Event-BUS
StudentCreated
Event Store


Event-BUS
Event-BUS
Event
Store

Command

`RegisterUser`

Domain Event

`AUserWasRegistered`

https://www.flickr.com/photos/stevedave/3566325269

Command

`RegisterUser`

Event

Domain Event

`AUserWasRegistered`

https://www.flickr.com/photos/stevedave/3566325269

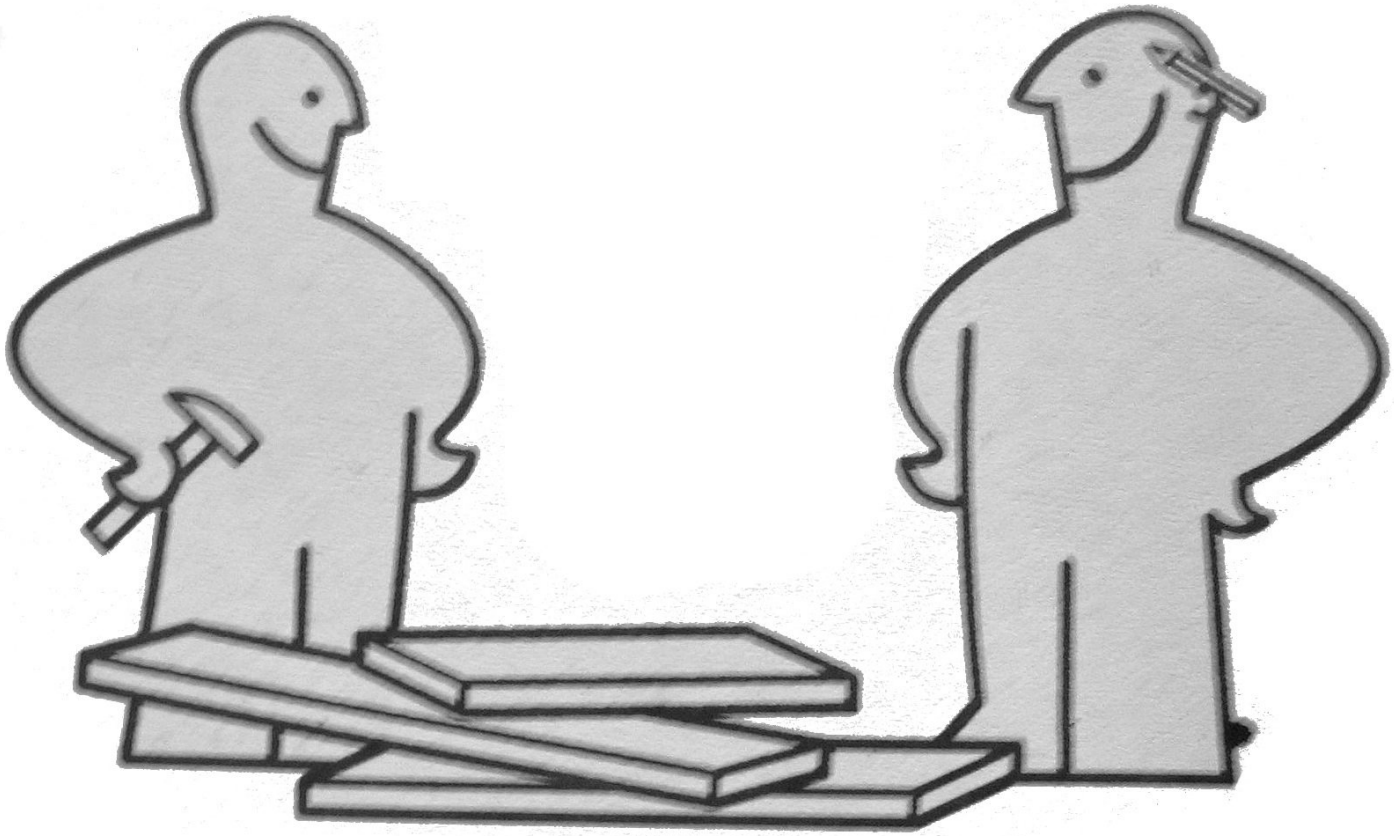
ES-Frameworks supporting JS

- Eventric
  https://github.com/efacilitation/eventric

- EventStore
  https://github.com/EventStore/EventStore

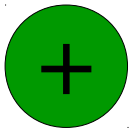
- Datomic
  https://github.com/limadelic/datomicjs
  https://github.com/tonsky/datascript

- Sourced
  https://github.com/mateodelnorte/sourced

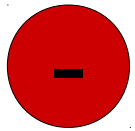


Do It Yourself

Event Sourcing



- Embrace Change
- No DB-Migrations
- No O-R Mismatch
- Better Scaleability
- Better Traceability



- Framework support lacking
- Additional Overhead
- Hard on Legacy

Event Sourcing

… has been done for many years

Event Sourcing

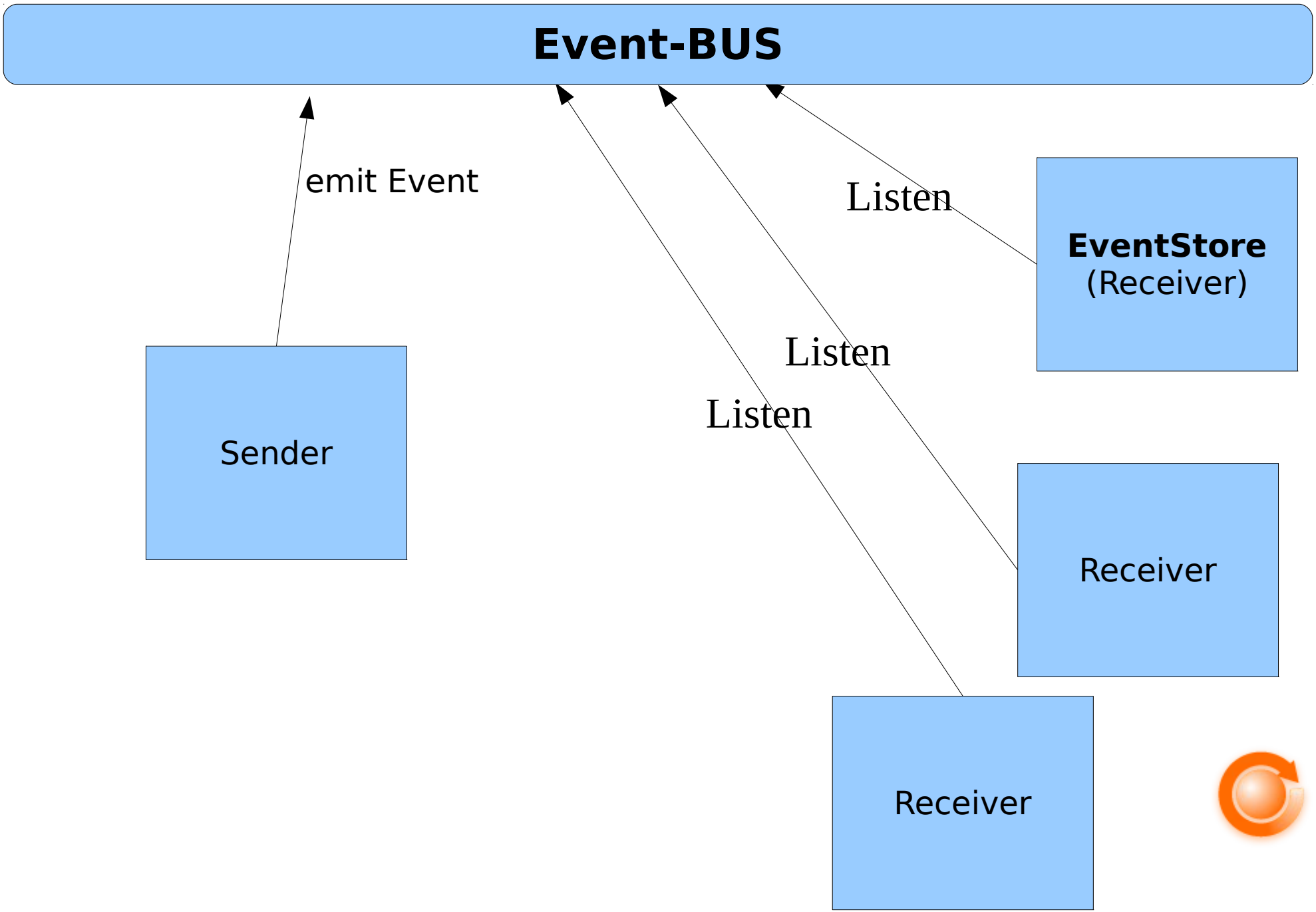
Event Sourcing

Event Sourcing

Kata: EventStore

- EventStore (In-Memory)
- Student (Course, Enrollment)
- Projection (In-Memory)

EventStore


Event-BUS
emit Event
Listen
EventStore
(Receiver)
Listen
Listen
Sender
Receiver
Receiver

Hints (JS)

- JSON.stringify(...) / .parse(...)
- uuid()
  http://rawgit.com/broofa/node-uuid/master/uuid.js

@marcoemrich

https://github.com/marcoemrich/

GO