Akka Stream

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Reactive Streams

- **Stream**: An active process that involves moving and transforming data.

- **Reactive Streams**:

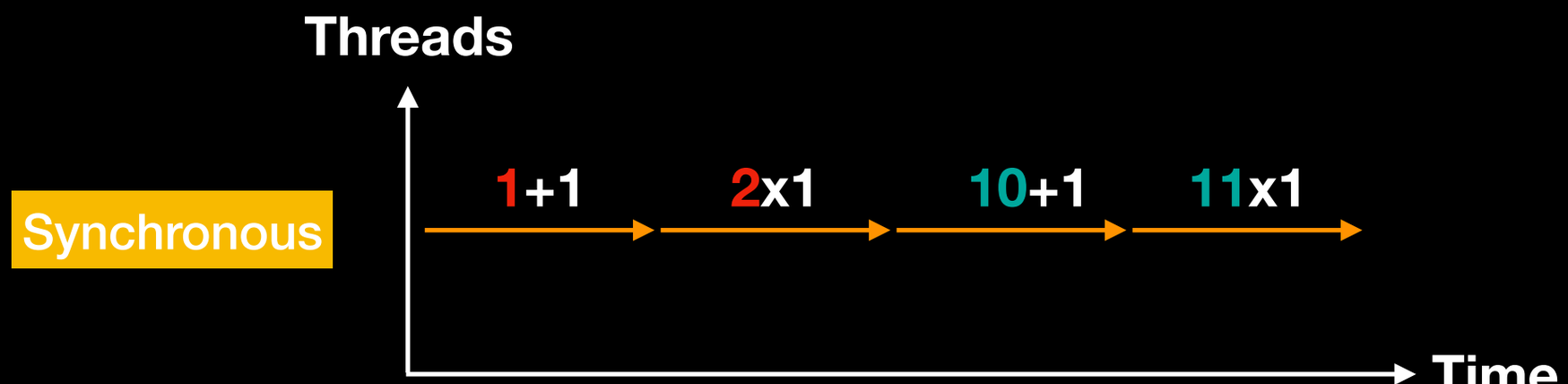
  1. Asynchronous stream processing

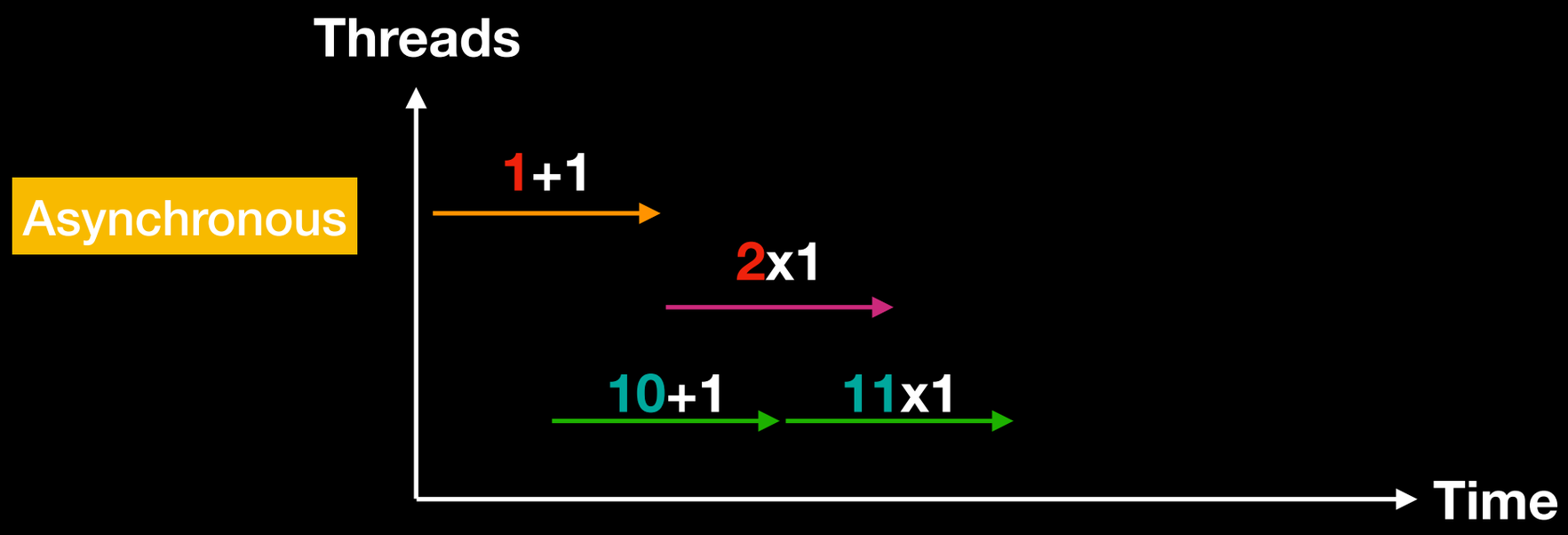
  2. non-blocking back pressure

Asynchronous Stream processing

Source :
1, 10,…

function: (element + 1) * 1

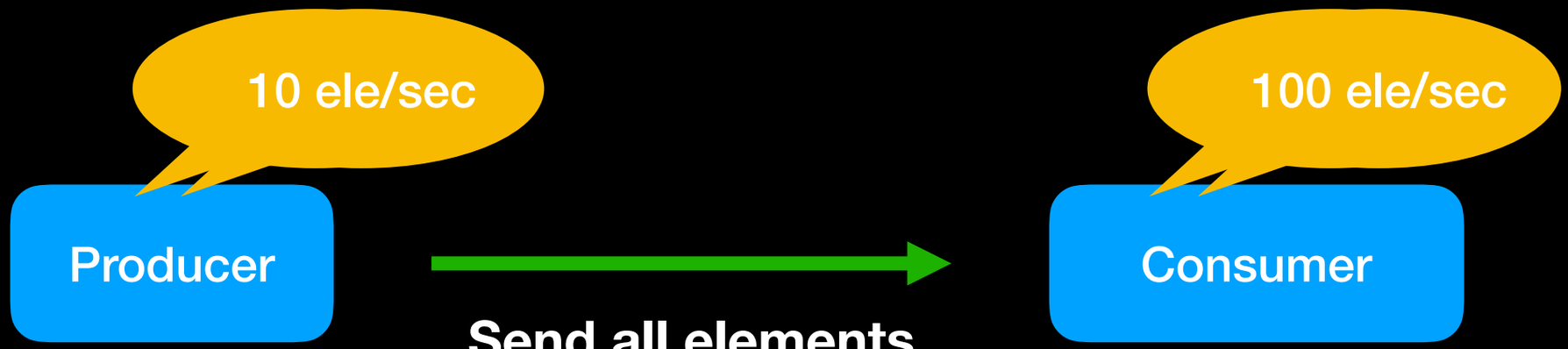




Asynchronous Stream processing

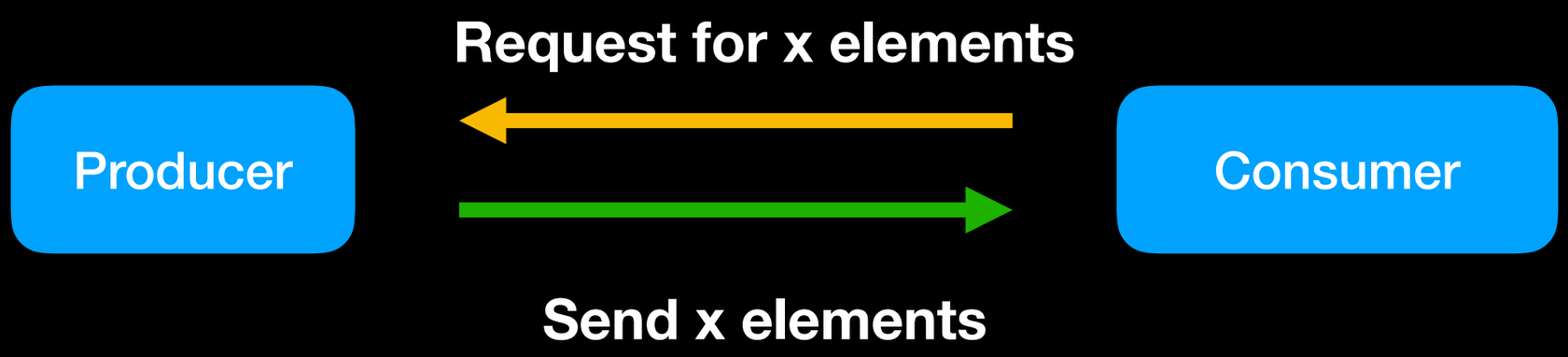
Fast producer, slow Consumer

Slow producer, fast Consumer



Back Pressure

- The benefits of asynchronous processing would be negated if the communication of back pressure were synchronous



Why Akka Streams

- Without involving blocking
- Avoiding OutOfMemoryException e.g. chunked file transfer
- Supporting error recovering
- Doing pipeline processing on a high level

Akka Streams

A Flow that has both ends “attached” to a Source and Sink respectively

A processing stage with *exactly one output*

A processing stage with *exactly one input*

Runnable Graph

Source

Sink

Flow

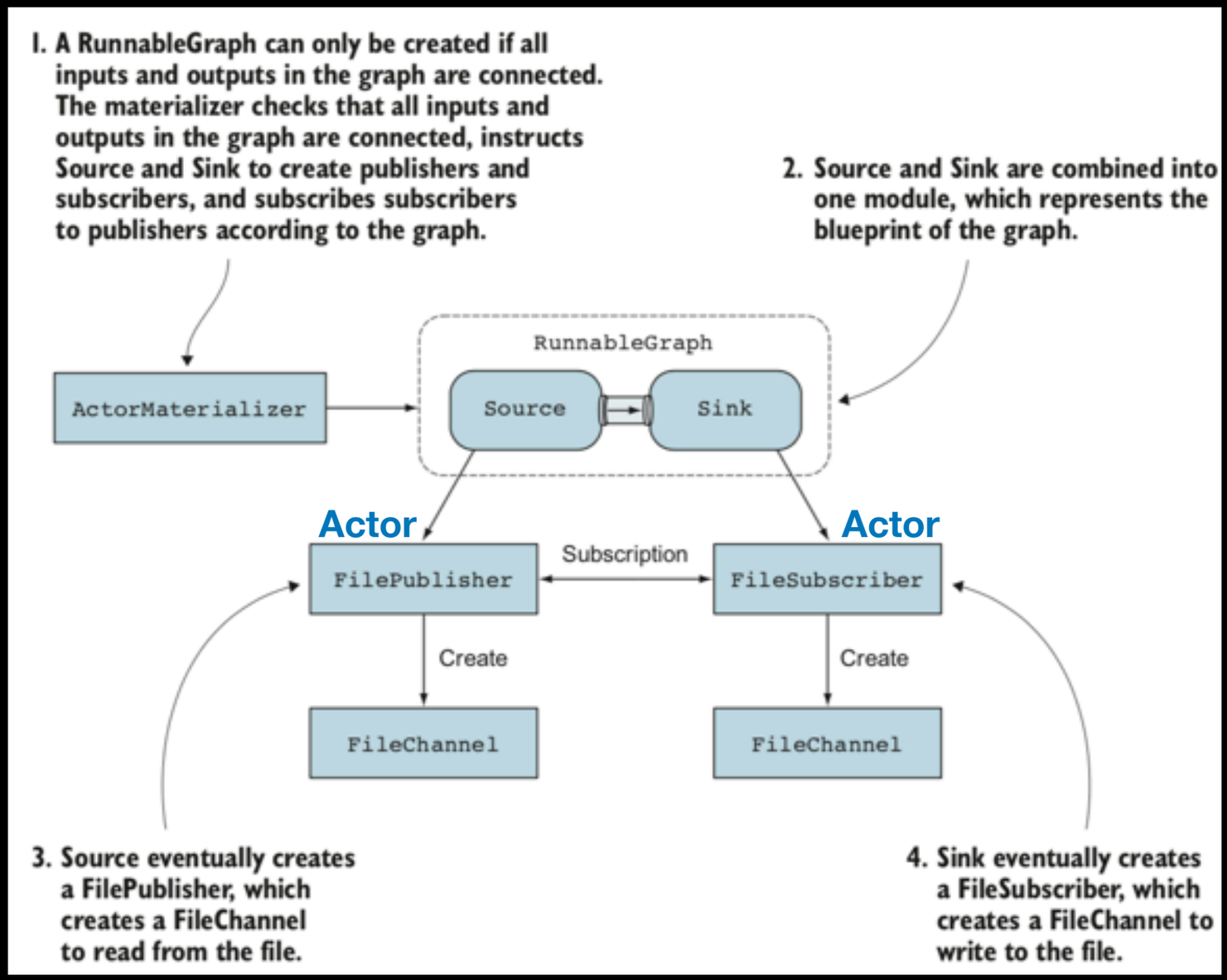
A processing stage which has *exactly one input and output*

Akka Streams

- An **ActorMaterializer** converts the **RunnableGraph** into actors, which execute the graph.

- **Stream Materialization** is the process of taking the stream description and allocating all the necessary resources it need in order to run.

Akka Streams

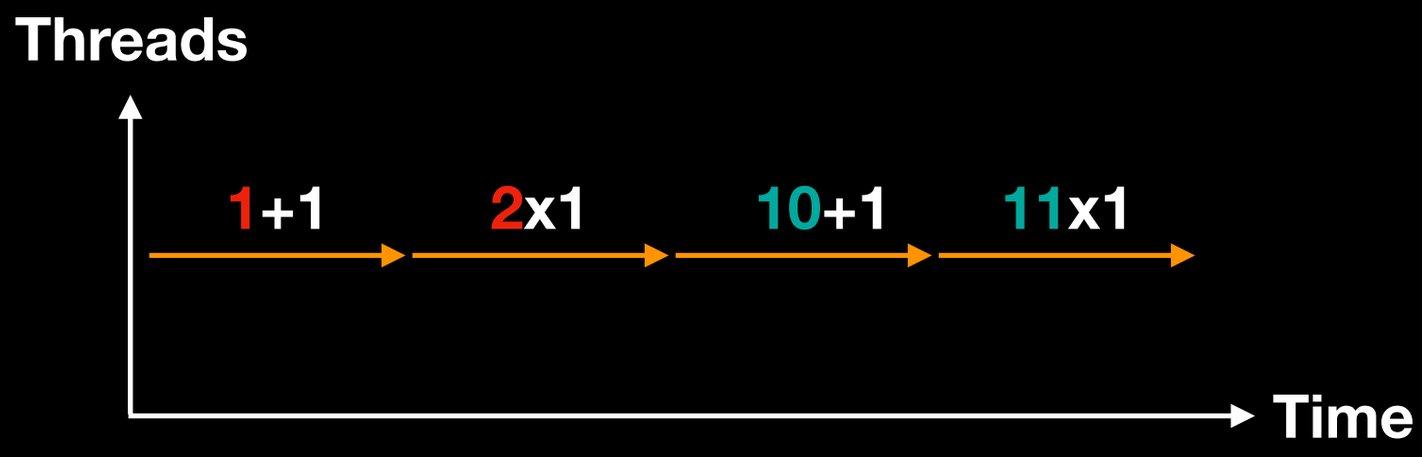


Refer to AKKA IN ACTION

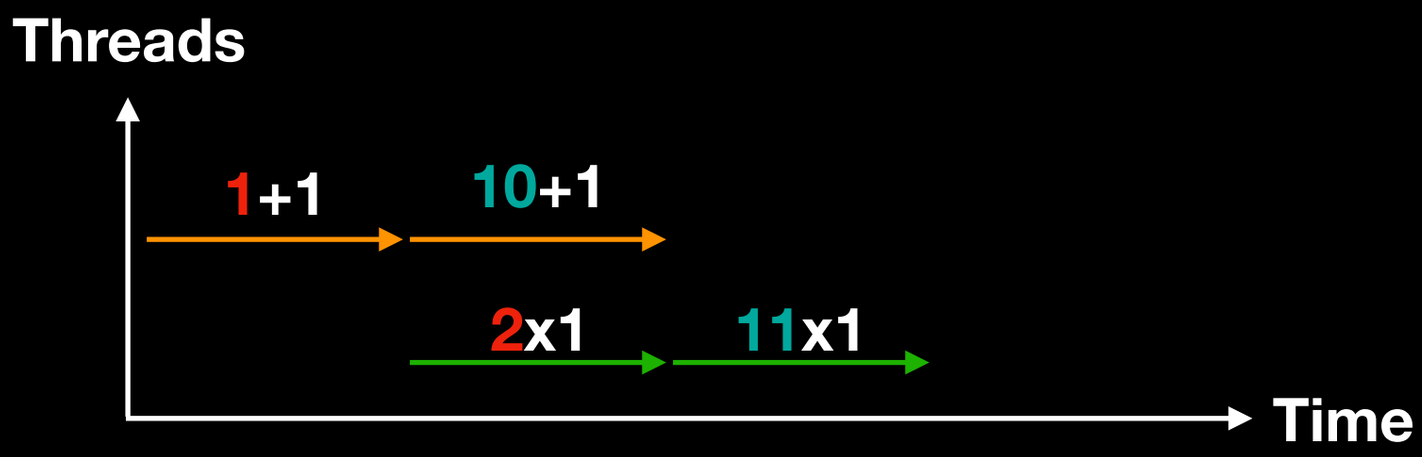
Akka Streams

- Stream stages usually share the same actor(**Operator fusion**) unless they are explicitly demarcated from each other by an asynchronous boundary
- How to process stream asynchronously?
    1. Async Boundary
    2. mapAsync or map(ele => Future { … })

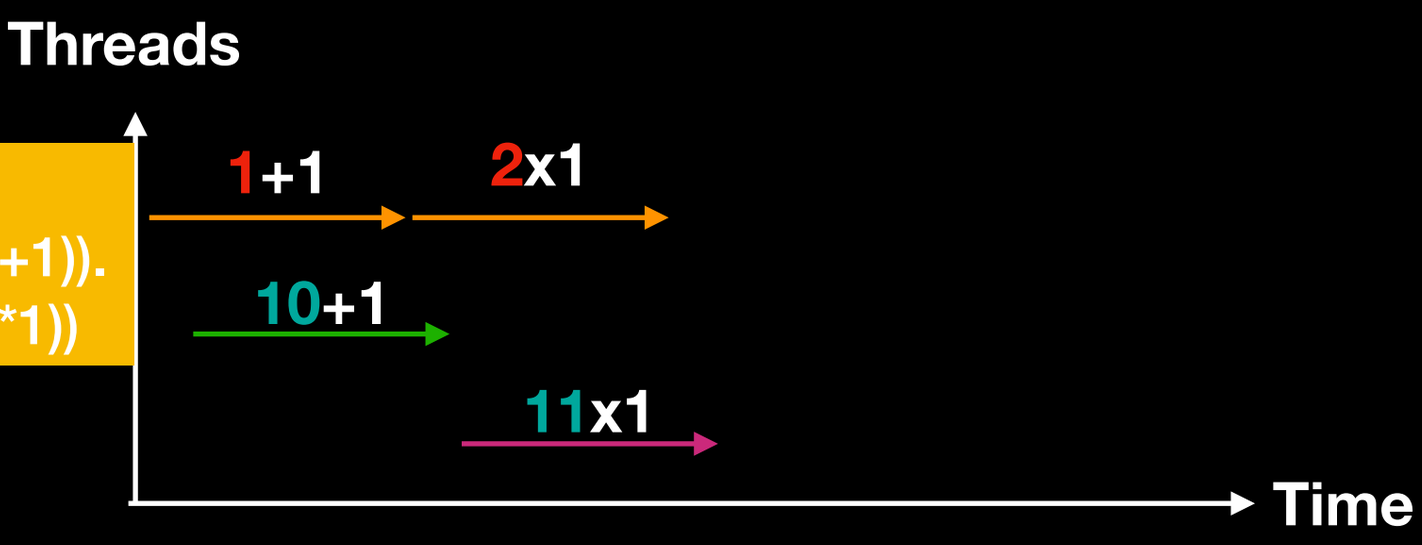
```
Source(List(1,10)).
map(_+1).map(_*1)
```




```
Source(List(1,10)).
map(_+1).async.
map(_*1)
```




```
Source(List(1,10)).
mapAsync(2)(Future(_+1)).
mapAsync(2)(Future(_*1))
```



Akka Streams

- Materialized Value:
  - a network of running processing entities, inaccessible from the outside
  - a materialized value, optionally providing a controlled interaction capability with the network


Everything is a stream

References

- https://akka.io/blog/2016/07/06/threading-and-concurrency-in-akka-streams-explained
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- https://www.manning.com/books/akka-in-action
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