Watermarking

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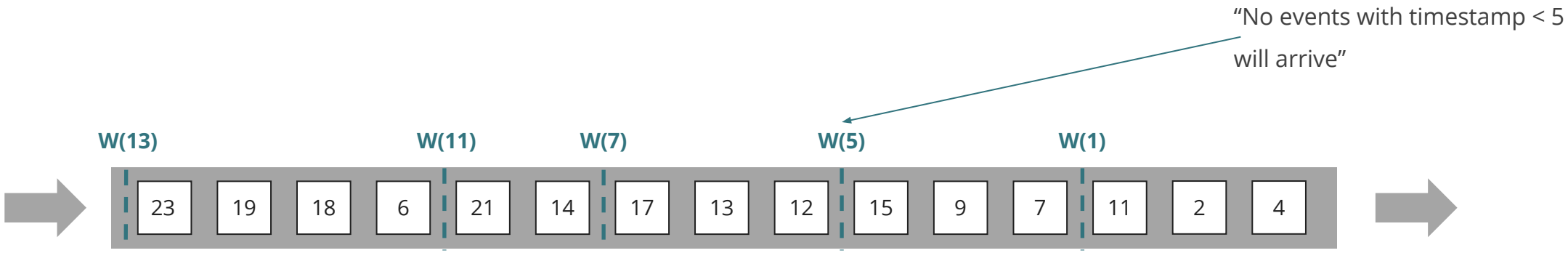
Watermarking

Reminder



- Watermarks push event time forward.
- They are provided by the data source or application
- They flow with the data stream and carry a timestamp

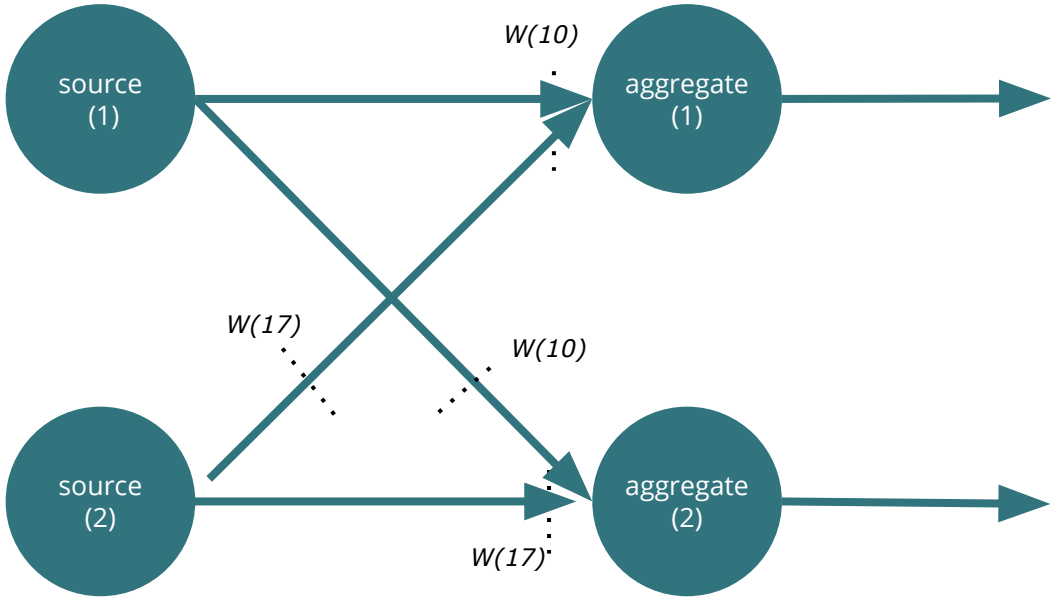
Watermarking

Watermark Assigners

- Periodic Watermarks
  - Based on a timer
  - `BoundedOutOfOrdernessGenerator` is an example
  - `ExecutionConfig.setAutoWatermarkInterval(msec)` controls the interval at which your periodic watermark generator is called
- Punctuated Watermarks
  - Based on something in the event stream

Watermarking

Watermarking in Parallel

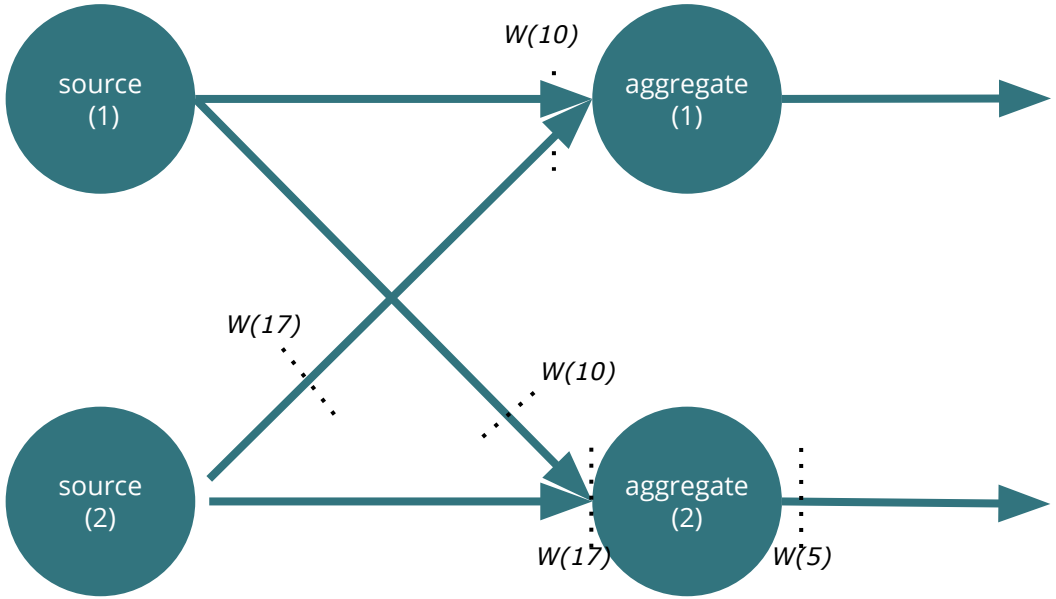


Current Low Watermark: 5

Source 1	5
Source 2	10

Watermarking

Watermarking in Parallel

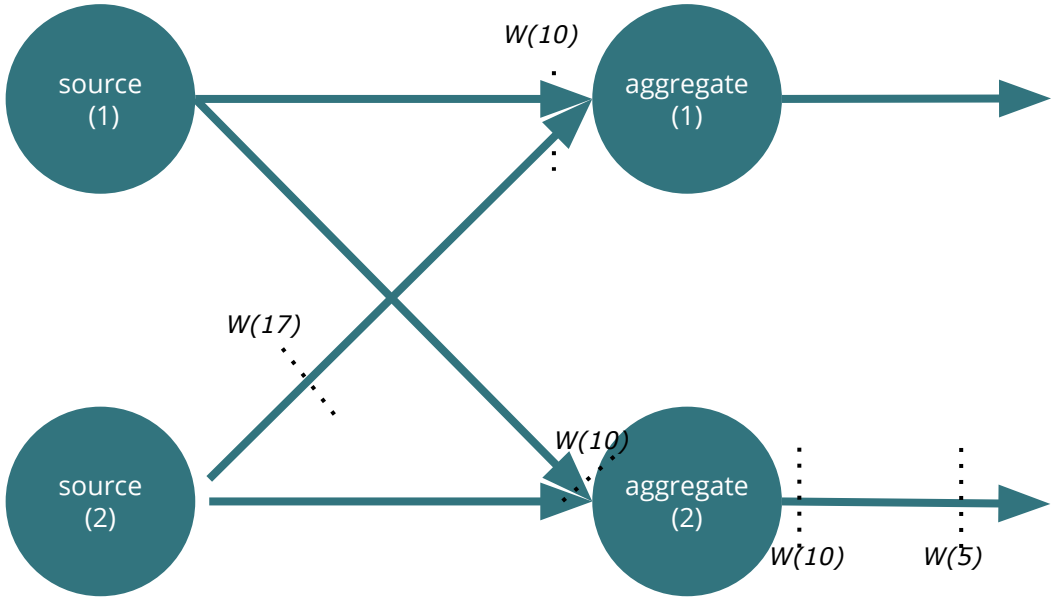


Current Low Watermark: 5

Source 1	5
Source 2	17

Watermarking

Watermarking in Parallel



Advanced Topics

Kafka Per-Partition Watermarking

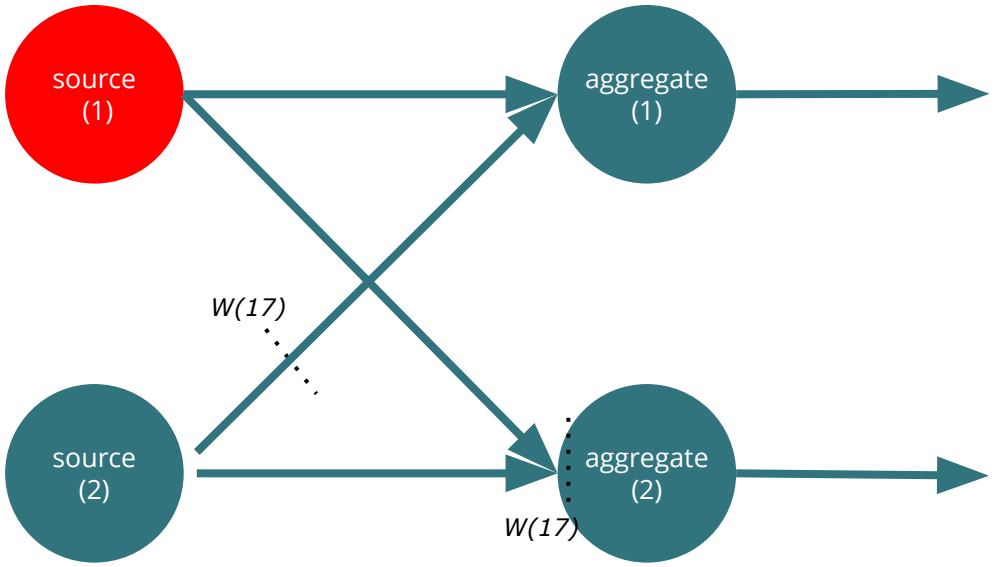
```
DataStream<KafkaEvent> input = env.addSource(new FlinkKafkaConsumer<>(...))
                    .assignTimestampsAndWatermarks(new CustomWatermarkExtractor())
```

VS

```
DataStream<KafkaEvent> input = env.addSource(
    new FlinkKafkaConsumer<>(...).assignTimestampsAndWatermarks(new CustomWatermarkExtractor()))
```

- Watermarks are assigned per partition and aligned inside the source
- Per-Partition watermarks lead to better watermarking in certain situations

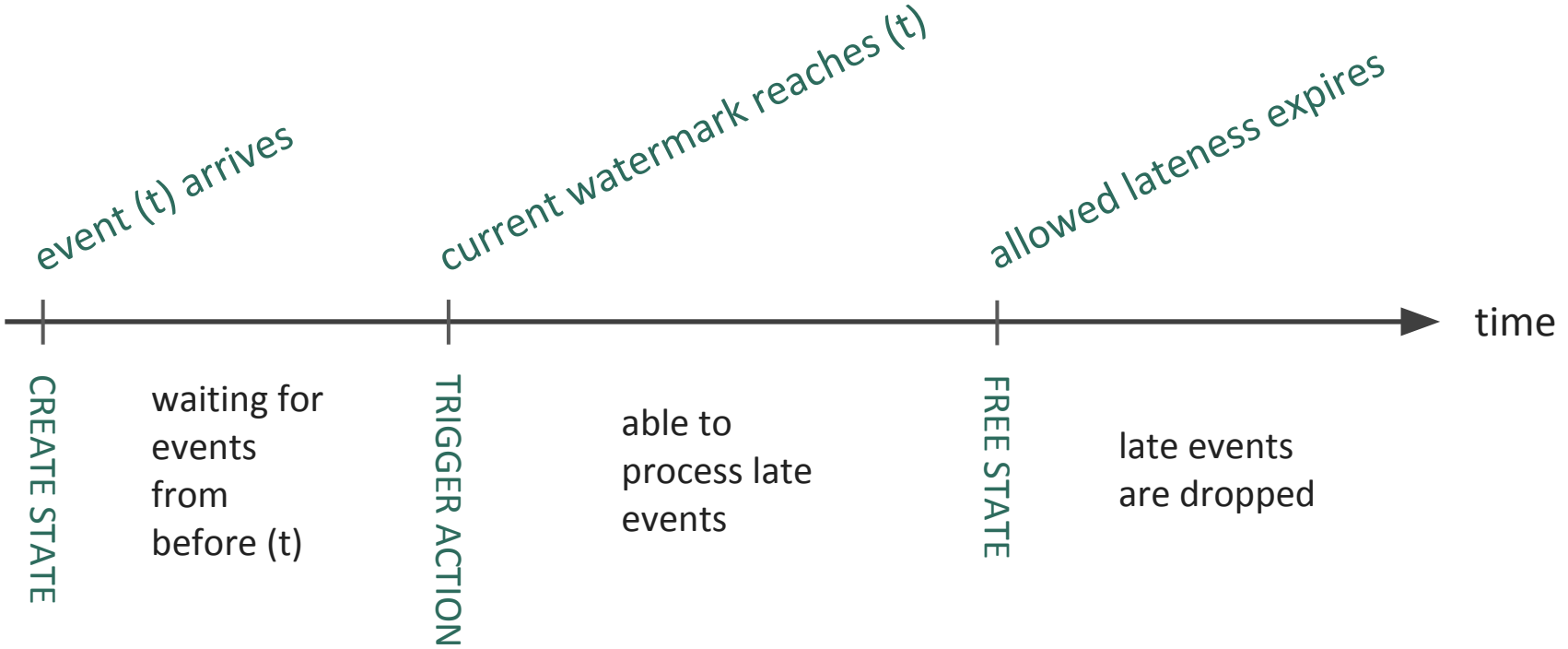
Idle Sources



Options

- Source marks itself idle via `SourceContext#markTemporarilyIdle()`
- `DataStream#rebalance()` prior to `TimestampAndWatermarkAssigner`
- `TimestampAssigner` or `SourceFunction` advances watermark based on processing time heuristic
  - Currently needs to be built by the user
  - FLINK-5479 will add support for Idle Timeouts in Flink

Dealing with Late Events



- Side outputs can be used to get a stream of the late data and deal with it
- Dealing with late data is application specific but the special code path could, e.g. update a value in the output database

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