Monitorama

Disintegrated Telemetry

The pain of monitoring asynchronous workflows

Johannes Tax
Principal Software Engineer at Grafana Labs

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Telemetry

Disintegration

Monitoring

Pain

Asynchronous

Workflows

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Distributed Tracing

Telemetry

Monitoring

Asynchronous

Workflows

"the process of losing cohesion or strength"

Disintegration

Pain

"an unpleasant sensory and emotional experience"

"asynchronous communication between different services"

messaging and eventing

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Asynchronous Workflows

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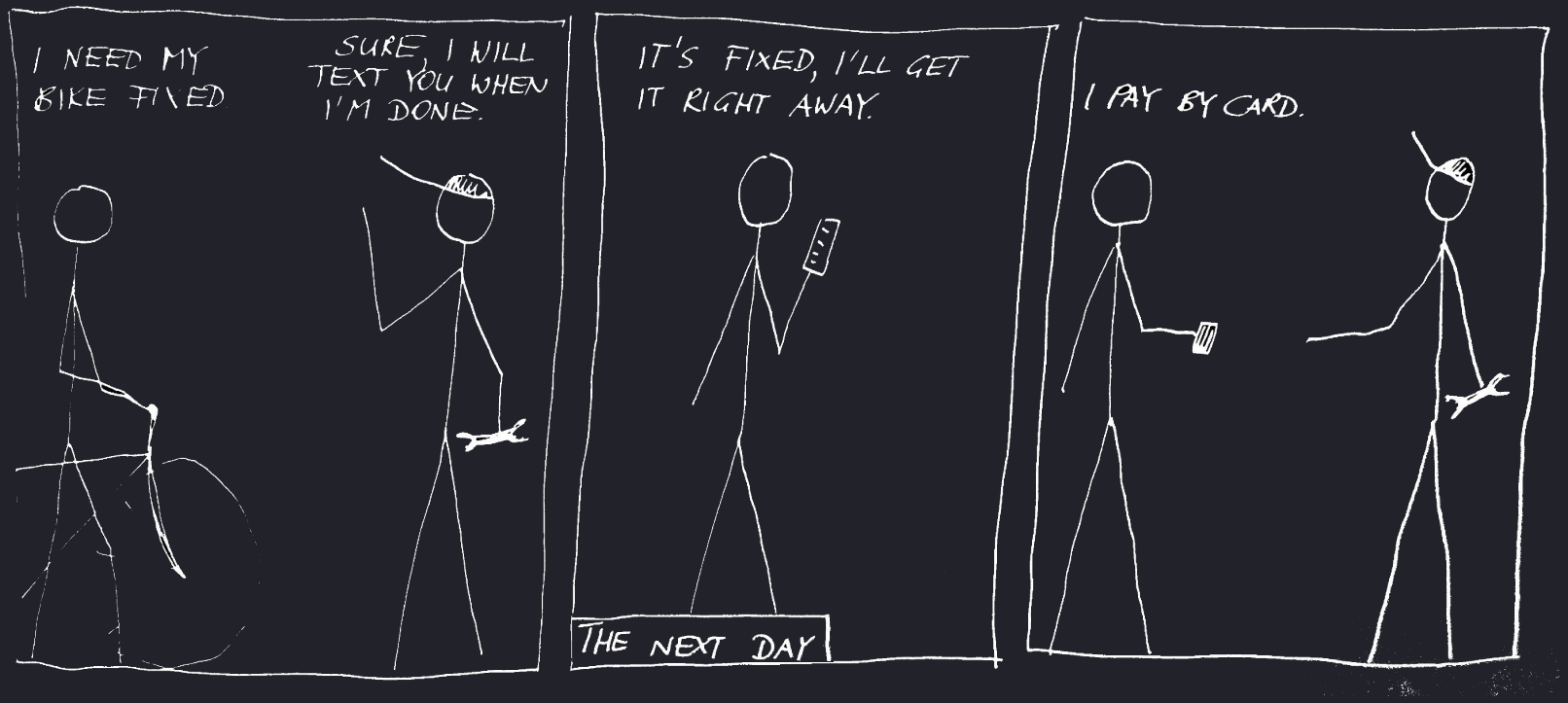
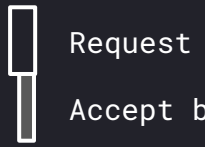
Example - Asynchronous workflow

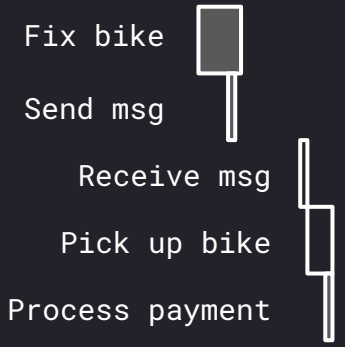


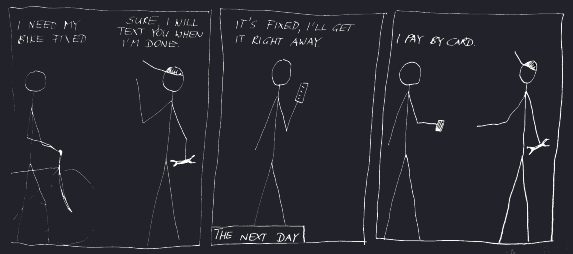
Example - Asynchronous workflow



Request fix for bike

Accept bike





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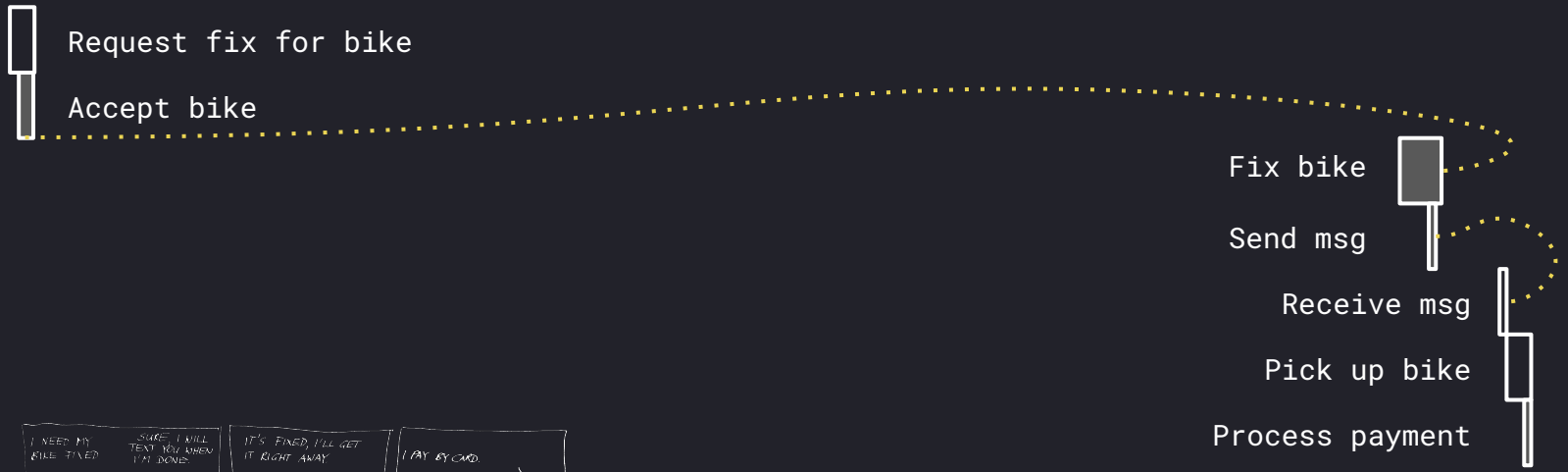
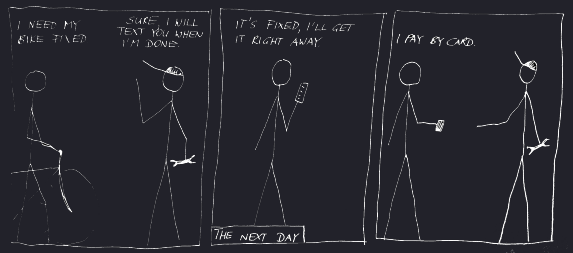
Temporal decoupling





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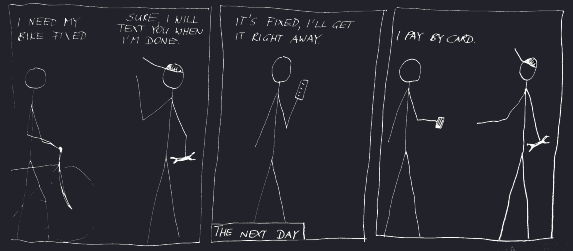
Temporal decoupling

- Producers and consumers
  - Aren’t restricted by each other’s availability
  - Don’t have to run concurrently
- Increases reliability and resilience



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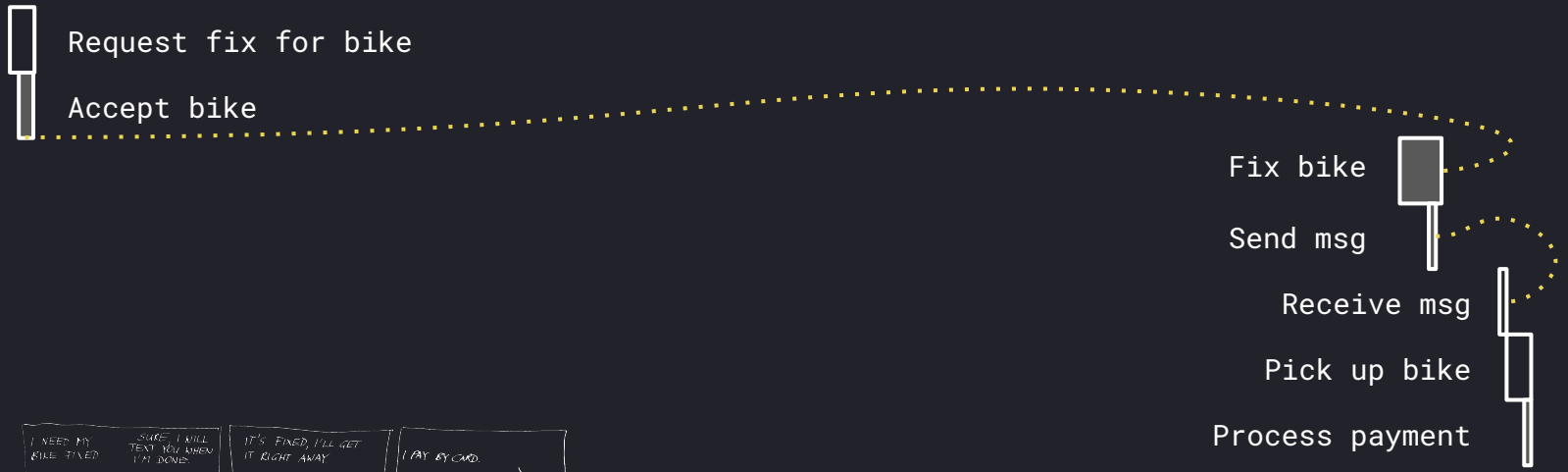
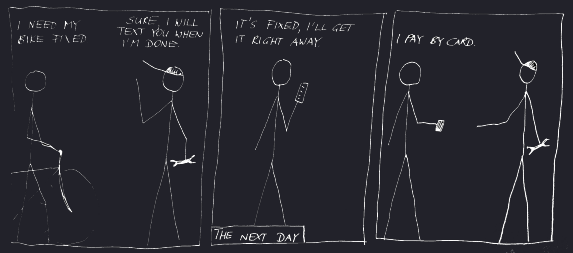
Temporal decoupling causes disintegration





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How to model an asynchronous workflow?

As a single trace:

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How to model an asynchronous workflow?

As a single trace:

Span relationships

- Parent-child relationship
  - 1:n relationship
  - One span can have only one parent
  - Constitutes a trace
- Span links
  - n:n relationship
  - Any span can have any number of links
  - Relates spans from different traces

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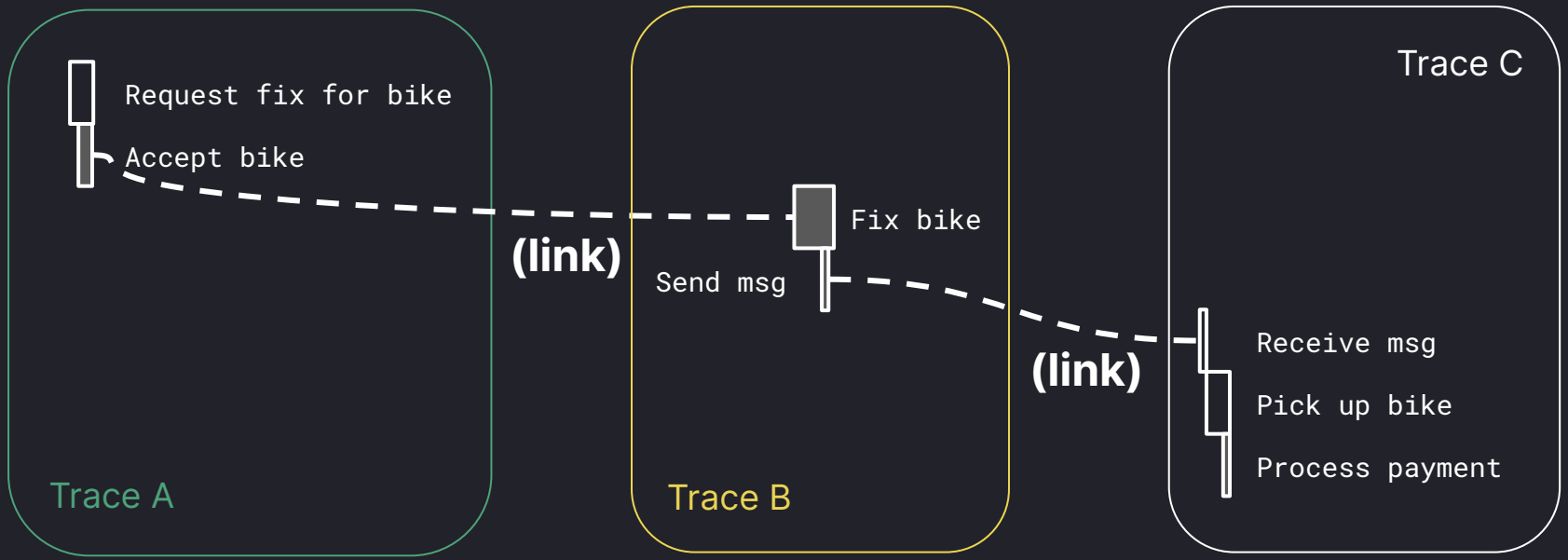
How to model an asynchronous workflow?

As multiple traces:



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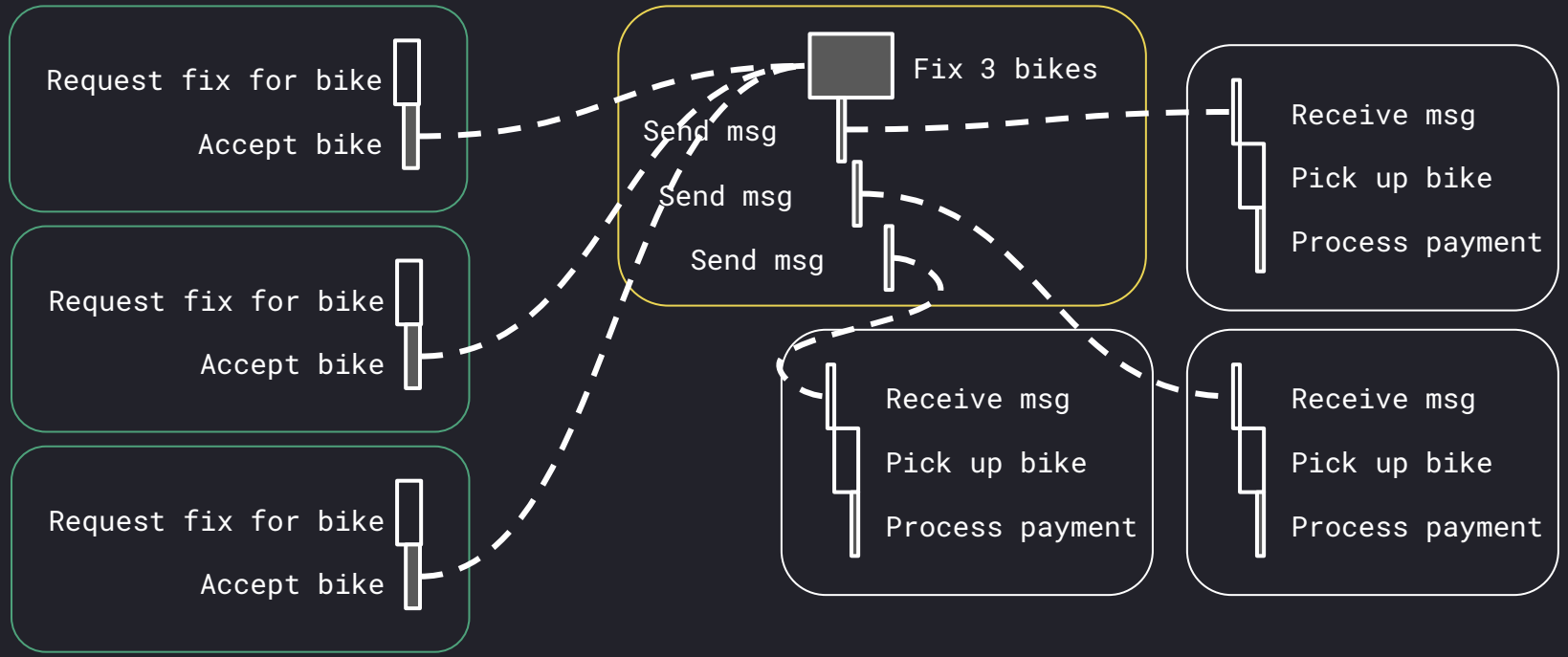

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Pain points

- No established best-practice
- As a single trace
  - Large and confusing traces for complex scenarios
  - Impossible to model certain workflows
- As multiple traces
  - Overkill for simple workflows
  - Varying levels of support from different tools and vendors
  - Breaks established sampling solutions
- Scenario-specific
  - Lack of consistency
  - Scalability challenges

OpenTelemetry Semantic Conventions

- Define span names, attributes names, and span relationships
- OpenTelemetry messaging workgroup
  - Stable semantic conventions for messaging traces and metrics
  - On OpenTelemetry's roadmap for 2024

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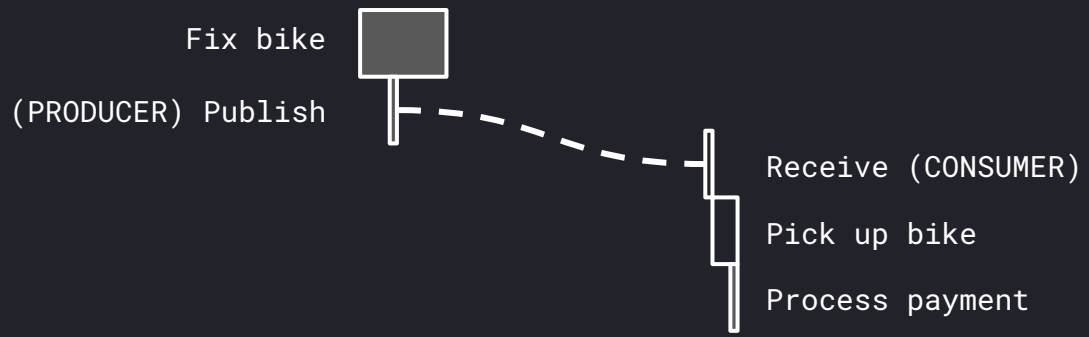
OpenTelemetry Semantic Conventions

Require a link between message producer and consumer spans



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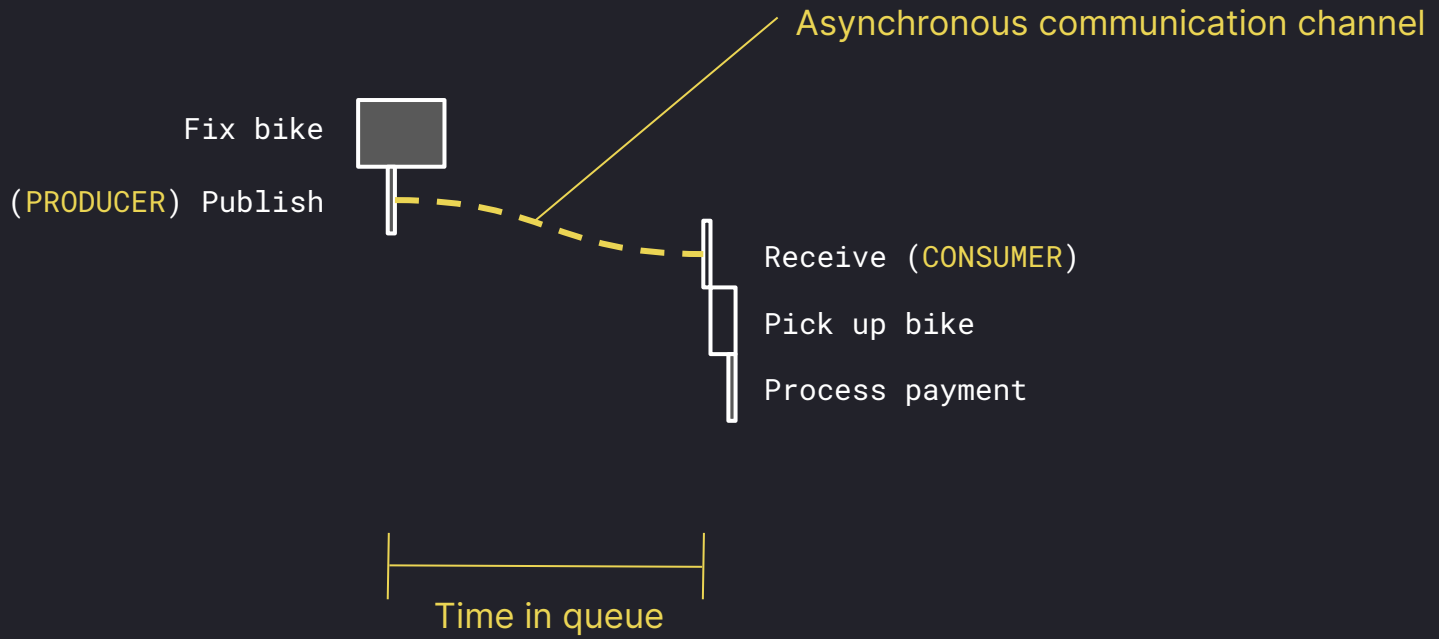

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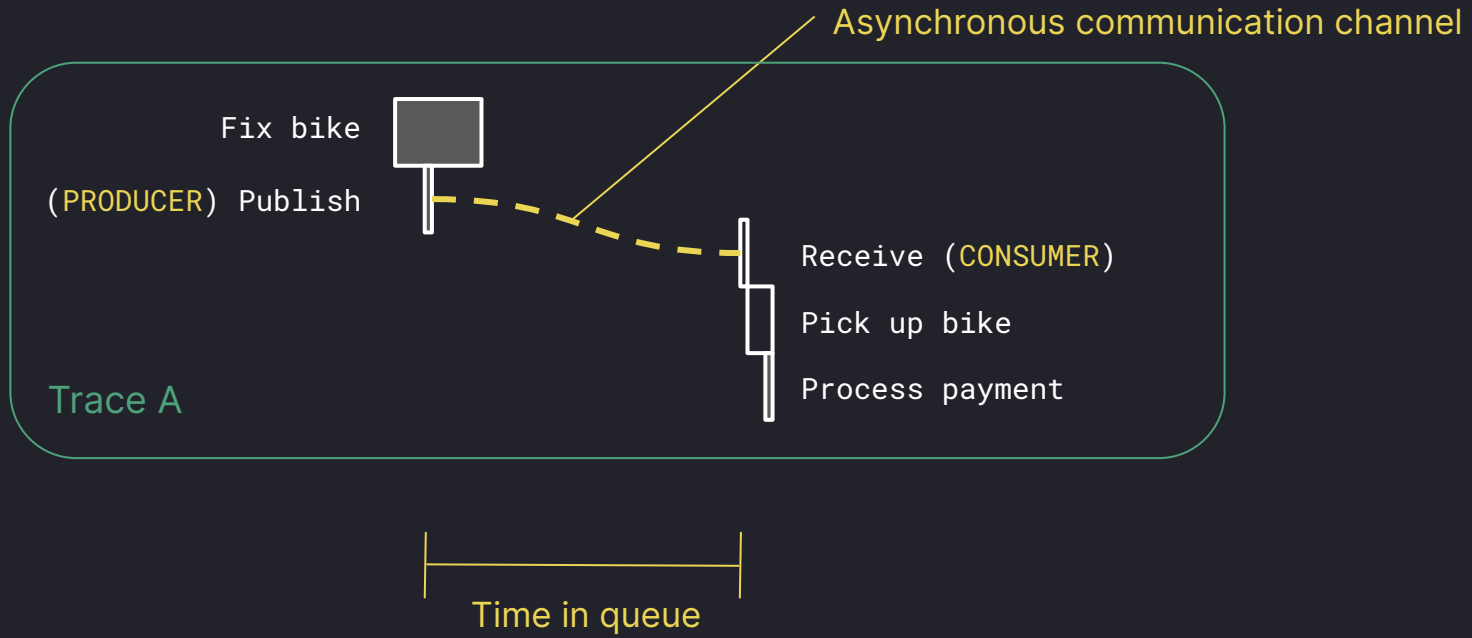

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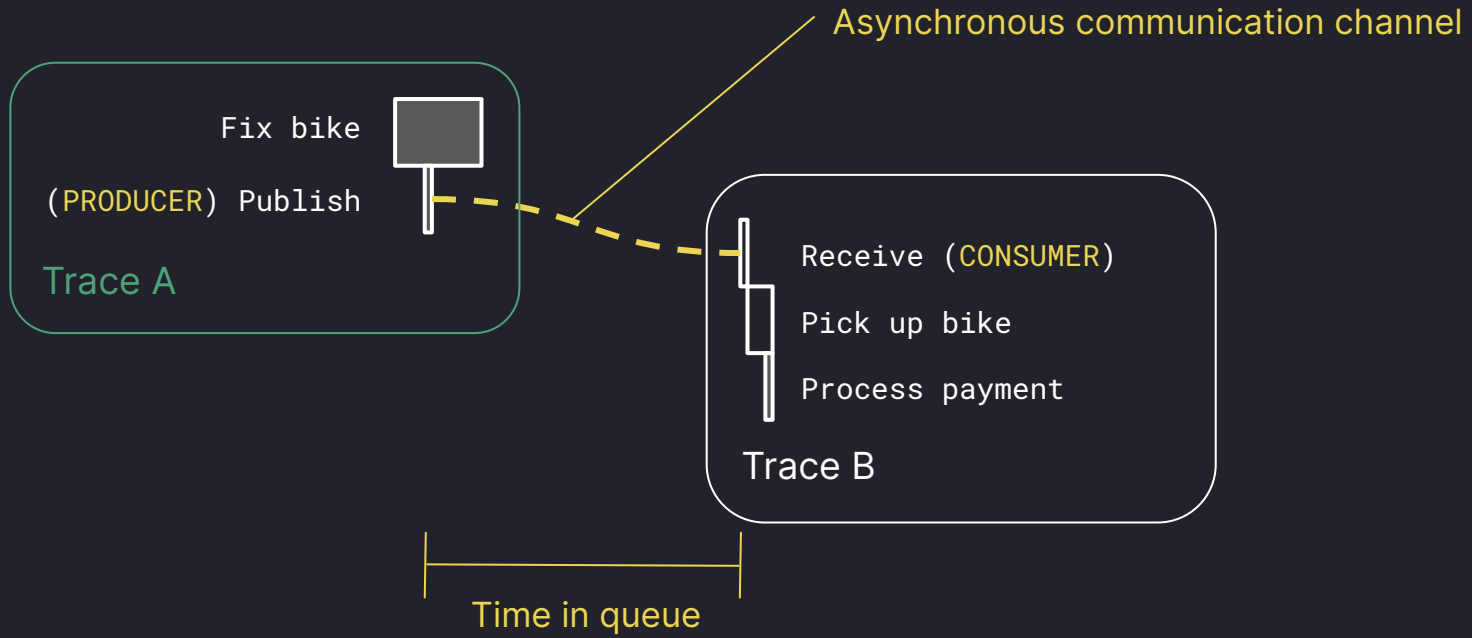

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❌ Impossible
🟠 Not yet solved
✅ Solved

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Pain points

- No established best-practice
  - 🟠 **Draft solution as part of an open standard**
- Large and confusing traces for complex scenarios
  - ✅ **Traces can be broken up**
- Impossible to model certain workflows
  - ✅ **All workflows can be modelled**
- Varying levels of support from different tools and vendors
  - 🟠 **Stable semantic conventions and instrumentations as a catalyst**
- Overkill for simple workflows
  - ✅ **Single-trace modelling is possible**
- Breaks established sampling solutions
  - 🟠 **Currently no link-based sampling solutions**
- Lack of consistency
  - ✅ **Reliable invariants across different modelling options**
- Scalability challenges
  - ✅ **Possibility to switch modelling options without losing invariants**

❌ **Impossible**

🟠 **Not yet solved**

✅ **Solved**

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“How should I instrument?”

- There’s a solution, BUT:
  - the instrumentation standard isn’t stable,
  - there exist very few instrumentation libraries,
  - context propagation standards aren’t stable,
  - it breaks existing sampling approaches,
  - and it’s not well supported by most vendors.

Work to be done

- Instrumentation standard
  - Traces
  - Metrics
- Instrumentation libraries
- Context propagation
  - W3C Trace Context AMQP First Public Working Draft
  - W3C Trace Context MQTT First Public Working Draft
  - CloudEvents Specification Extension for Distributed Tracing
- Sampling
- Vendor support for span links

Get in touch

- Monitorama Slack
  - #talk-johannes-tax
- CNCF Slack
  - #otel-messaging
  - @Johannes Tax
- Weekly meeting Thursday 8am PST
- GitHub issue