Queryable State

How to Build a Billing System Without a Database

Maximilian Bode, Konstantin Knauf

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- Software Engineers with TNG Technology Consulting
- Focus on
  - Distributed Systems
  - Real-Time Processing
- Flink in Production for 1.5 y

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Agenda

1. Intro to Queryable State
2. Use Case: A Queryable Billing System
3. Live Demo of Our Prototype

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Intro to Queryable State

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Evolution of Streaming Architecture

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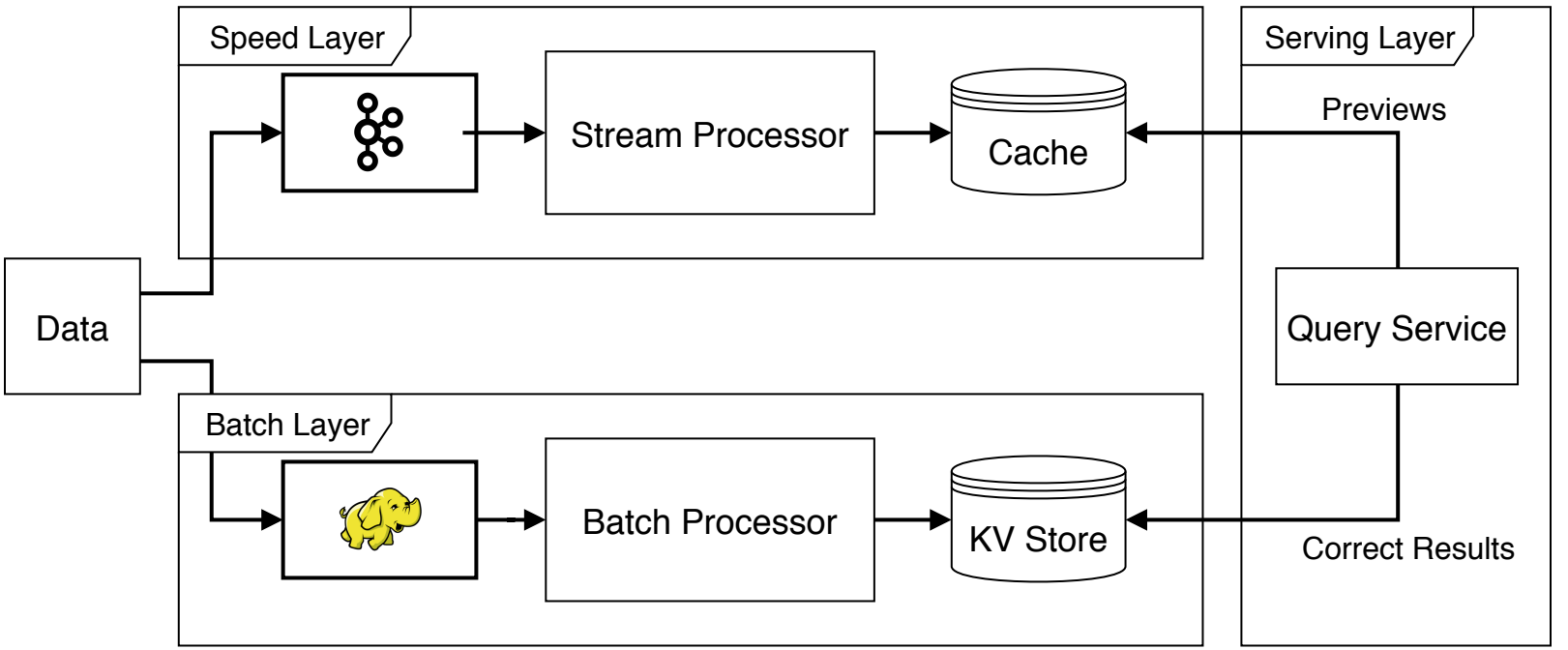

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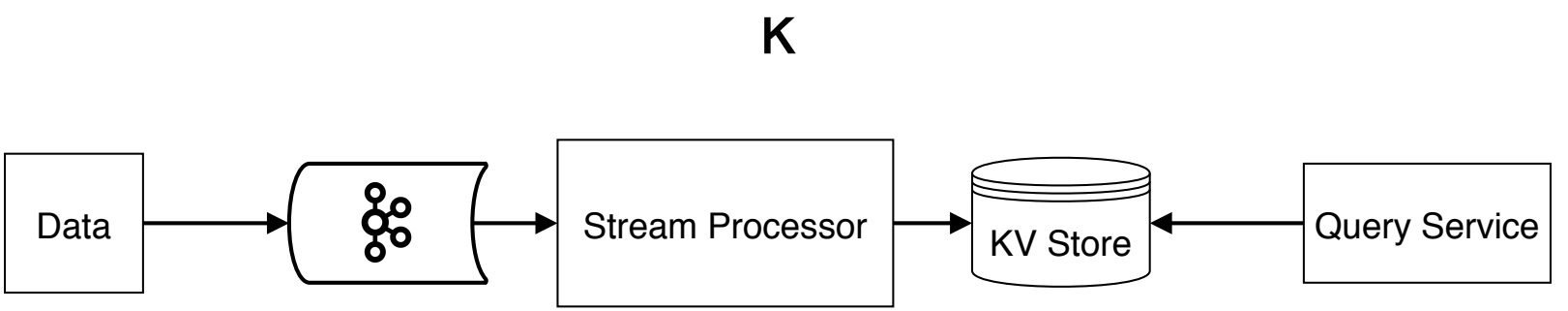

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Queryable State

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Implementation in Flink

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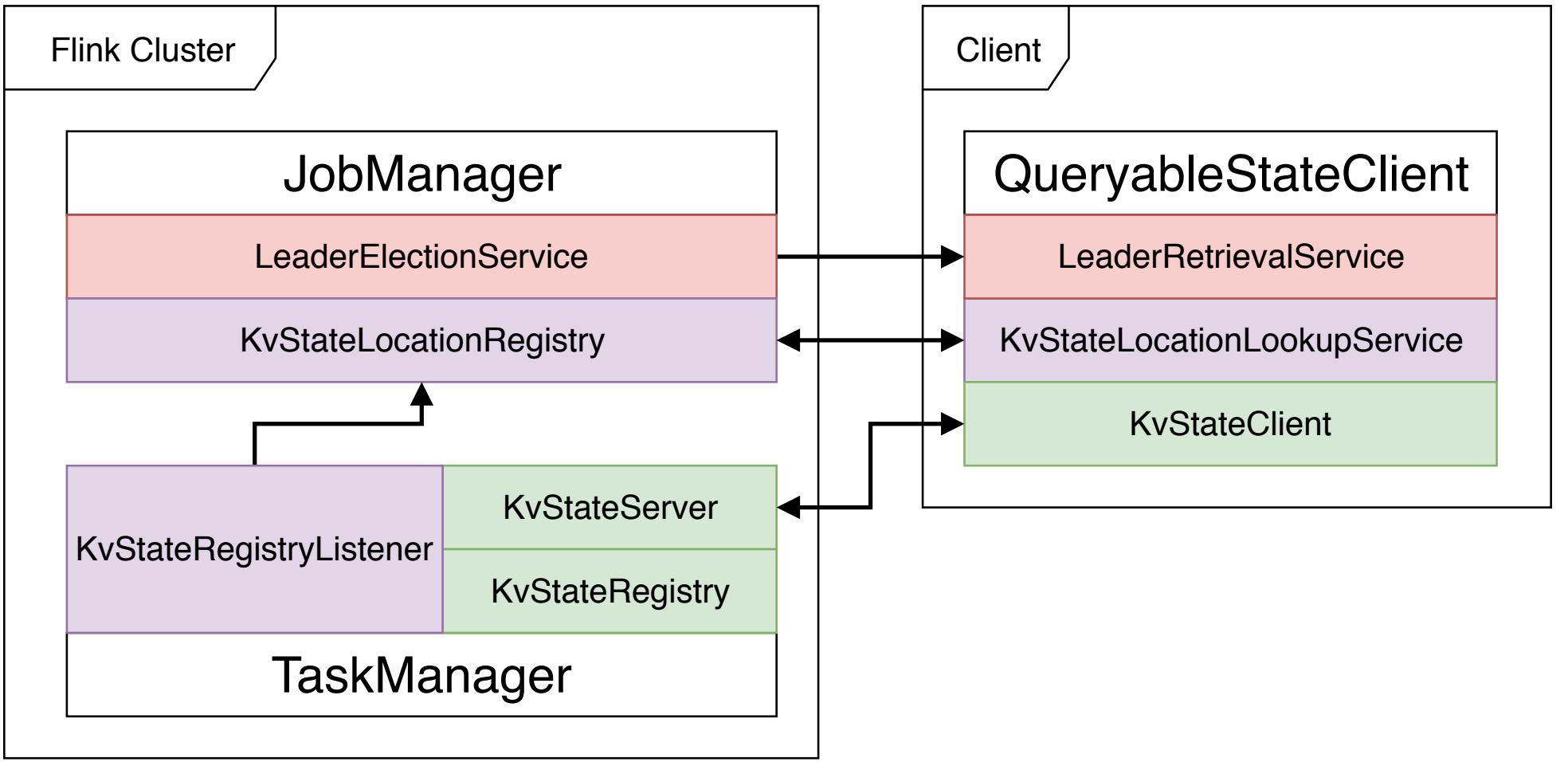

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Use Case: “Queryable Billing”

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Requirements

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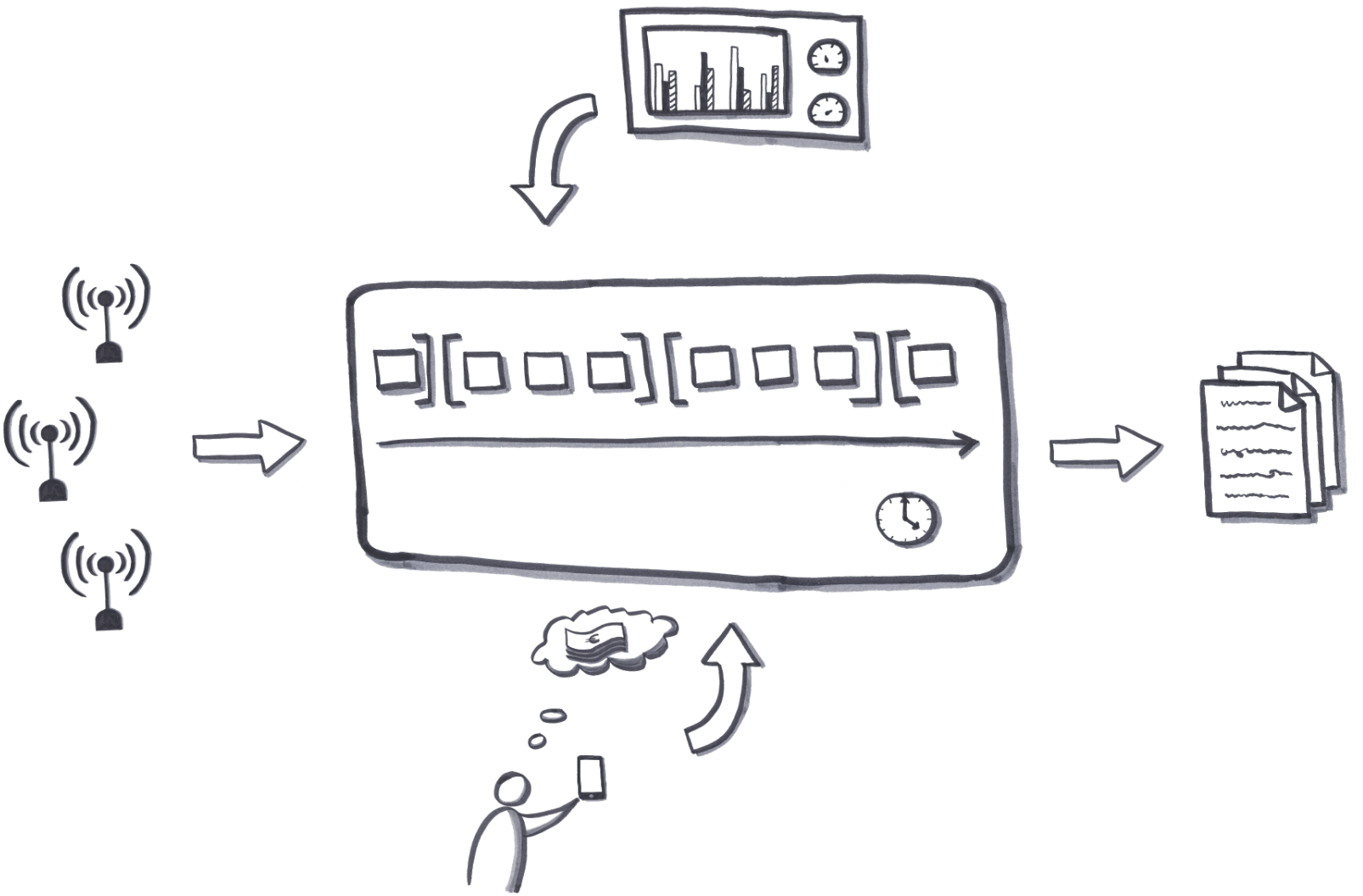

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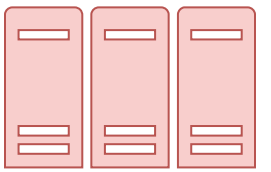
Correctness

Robustness

Availability



Scalability

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Architecture

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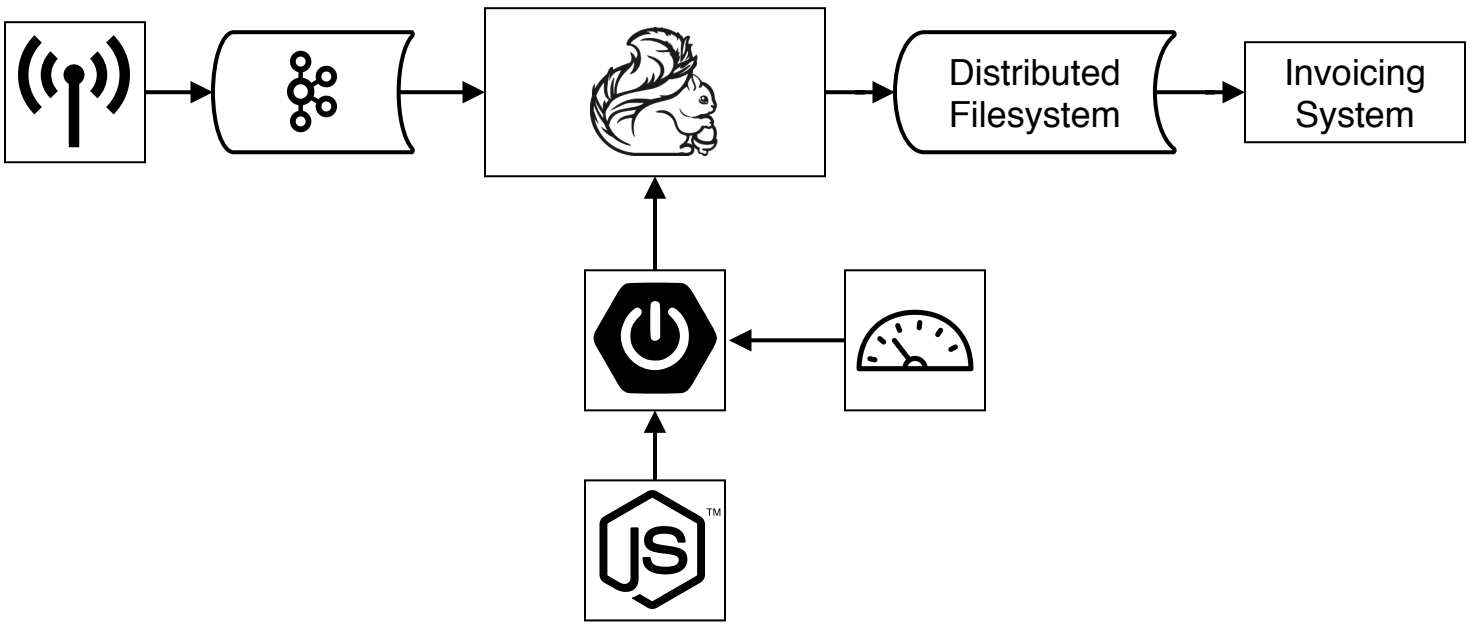

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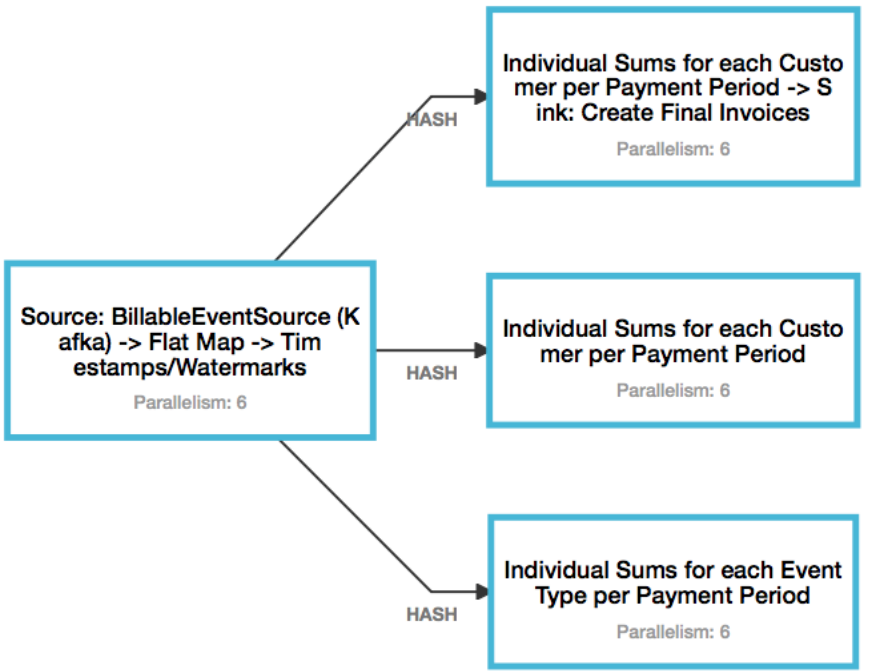

- Events from Kafka
- Final Invoices
  - `TimeWindow` with `FoldFunction`
  - `BucketingSink`
- Previews
  - `TimeWindow` with `FoldFunction`
  - `CountTrigger.of(1)`
  - Queryable State in `WindowFunction`

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Demo

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Requirements

- Invoices
- Live Updates
- Correctness
- Availability
- (Scalability)
- Robustness
  - Late Events
  - TaskManager
  - JobManager
  - Sink

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Invoice Generation

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Requirement		Demo
Invoices		✔
Live Updates		
Correctness		(✔)
Availability		
Robustness	Late Events	✔
	TaskManager	
	JobManager	
	Sink	

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Live Updates

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Requirement		Demo
Invoices		✔
Live Updates		✔
Correctness		(✔)
Availability		
Robustness	Late Events	✔
	TaskManager	
	JobManager	
	Sink	

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TaskManager Failure

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Requirement		Demo
Requirement		Demo
Invoices		✔
Live Updates		✔
Correctness		(✔)
Availability		(✔)
Robustness	Late Events	✔
	TaskManager	✔
	JobManager	
	Sink	

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JobManager Failure

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Requirement		Demo
Requirement		Demo
Invoices		✔
Live Updates		✔
Correctness		(✔)
Availability		(✔)
Robustness	Late Events	✔
	TaskManager	✔
	JobManager	✔
	Sink	

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Failure of Downstream Systems

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Requirement		Demo
Requirement Invoices		Demo ✔
Live Updates		✔
Correctness		✔
Availability		(✔)
Robustness	Late Events	✔
	TaskManager	✔
	JobManager	✔
	Sink	✔

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Current Limitations

- Native Support for Queryable State in Windows
- Improvements of Client API
- State Size
- Availability in Case of Job Failures

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Questions?

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