Building Resilient Asynchronous Commerce Systems

- **Observability Lessons from Event-Driven Architectures**

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- **Conf42 Observability 2025**

Opening Statement

- **"In a world where milliseconds define conversion rates, observability is no longer optional—it's foundational."**

- **Quick overview of digital commerce shift**

Problem Statement

- **Legacy synchronous systems struggle with scale and resilience.**
- **Event-driven systems introduce new visibility challenges.**

Rise of Asynchronous Commerce

- **Shift from synchronous to async due to:**
- **- Scale**
- **- Personalization**
- **- Omnichannel**

- **Powered by:**
- **- Microservices**
- **- Headless commerce**
- **- Event-driven design**

Use Case Overview

- **Real-world implementation at T-Mobile USA.**
- **Architecture built for BOPIS and async payments.**

What Makes Async Hard to Observe?

- - Invisible workflows
- - Delayed or decoupled failures
- - Limited tooling for event tracing

Observability Framework

- **Four pillars:**
- **1. Distributed Tracing**
- **2. Event Audits & Replay**
- **3. Consistency Monitoring**
- **4. Domain Event Dashboards**

BOPIS Workflow

- **Event flow of BOPIS order:**
- **- Inventory**
- **- Fulfillment**
- **- Pickup coordination**

Asynchronous Payment Processing

- **Benefits:**
- **- Instant order creation**
- **- Async validation**
- **- Retry logic**

- **Strategies:**
- **- Status pipelines**
- **- Failure queues**
- **- Fallback tracing**

Tools & Techniques

- - OpenTelemetry for tracing
- - Kafka metrics for queue health
- - Custom event replay dashboards

Measuring Success

- **Metrics observed:**
- **- 75% faster checkouts**
- **- 15–20% lower abandonment**
- **- 97% availability during peak**

Handling Eventual Consistency

- **CAP theorem tradeoff:**
- **- Compensating transactions**
- **- Version vectors**
- **- Idempotency**

Testing & Monitoring

- **Focus on:**
- **- Testing event-driven chains**
- **- Monitoring queue depth, latency, causality**

Lessons Learned

- - Design for traceability from day one
- - Embrace eventual consistency
- - Establish domain-aligned observability

Closing Thoughts

- **Async commerce is the future.**
- **Observability bridges complexity and clarity.**

Thank You

- **Contact: sarabuanup@gmail.com**
- **Questions?**