CASE STUDY
Risk Focus Delivers Order Management Platform at Top 20 Global Bank
Risk Focus’s expert knowledge of trading systems complemented Confluent's expertise with Kafka-based architectures to successfully redesign this mission-critical system. Risk Focus’s attention to detail, combined with its iterative approach to software development, ensured that the client's business needs would be met by the new streaming platform.

Tom Arnemann
GLOBAL DELIVERY DIRECTOR, SERVICES
CONFLUENT

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Executive Summary

The wealth management division of a top 20 global bank engaged Risk Focus to re-architect its order management system using Kafka. Risk focus worked closely with Confluent to deliver a re-architected streaming application that efficiently, reliably, and securely handles orders for the client’s entire line of products.

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About the Client

Client is the wealth management division of a top 20 global bank. They provide investment advice to help preserve and grow wealth, customizing their strategy with each client using a combination of equities, options, and mutual funds.
The Challenge

The client’s proprietary trade order management system was in need of a technology refresh in order to provide greater throughput, resiliency, and fault tolerance. The new platform had to meet the following requirements:

- Process a minimum of 250 orders per second with the ability to scale linearly
- Real-time replication across multiple data centers
- Recovery of messages from a specific point in time (in case of unavailability of external systems)
- Message sequence guarantees for all events related to the same trade order
- Elimination of single points of failure

Why the Client Chose Risk Focus

Risk Focus is a Premier Confluent Systems Integrator and the only partner in the Confluent ecosystem focused exclusively on financial services. Risk Focus was selected because of its unique combination of business domain knowledge, technical expertise, and Agile delivery process.
The Solution

The new architecture was based on a data processing platform with Kafka at its core. An initial Proof of Concept (POC) allowed the client to assess the effectiveness of the new system for handling equities orders. Risk Focus incorporated client input on the performance and reliability of the re-architected application and expanded the system to handle the client’s complete line of products.

The Kafka Setup

The Kafka cluster was based on reference architecture provided by Confluent, which included VM sizing, kernel parameters, file handles, and additional specifications.

- A multi-region cluster was built across three states, providing synchronous, real-time replication in an Active-Active-Active environment.
- Ansible playbooks were written to automate deployment of the cluster, based on the cp-ansible playbook provided by Confluent.
- Confluent Control Center was setup to monitor system health and end-to-end message delivery.
- SSL with SASL/SCRAM was used for security, with the intention of future replacement with Kerberos.
- Monitoring was setup using the customer’s AppDynamics deployment.
**Application Setup**

A microservices architecture consisting of the following services was built out:

- A bulk order entry service, whose input is a Kafka topic. This simulated a delay and published messages to the output topic.
- A gateway component that reads messages from the output topic and converts them to FIX protocol using a simulated FIX engine.
- A HTTP order entry service, which received single order at a time over REST and published them to the output topic.

**Performance and Fault Testing**

Risk Focus worked closely with Confluent to develop an extensive fault-testing plan for the client’s application while the Confluent team worked to help build out the extensive platform deployment.

- KSQL Datagen was used to produce test data in bulk, based on a provided schema. Risk Focus setup an AVRO schema for “Order” messages.
- The high availability and fault tolerance of Confluent’s multi-region cluster enabled the team to prove that the system could withstand a single data center failure, albeit with reduced capacity, and without message loss.
Technology Leadership

Risk Focus provided mentoring to client teams throughout the software development lifecycle, enabling them to maximize the benefits of their new Kafka-based system.

- Training team members in the use of Spring for Apache Kafka
- Performing code reviews
- Implementing efficient Git flows

Results and Benefits

Risk Focus worked closely with Confluent to deliver a high-performance, resilient order management system for the client. The Risk Focus team successfully delivered the entire system on budget and according to the client’s specifications. As a result, the client now has an application that can handle orders for its entire line of products in a highly available, fault-tolerant system. “Risk Focus’s expert knowledge of trading systems complemented Confluent’s expertise with Kafka-based architectures to successfully redesign this mission-critical system,” said Tom Arnemann, Confluent Professional Services. “Risk Focus’s attention to detail, combined with its iterative approach to software development, ensured that the client’s business needs would be met by the new streaming platform.”
Learn More

Founded in 2004, Risk Focus is a consultancy solving capital markets business problems with technology and insight. The firm combines business domain knowledge, technology expertise, and disciplined process to ensure the success of the most challenging projects in the industry. Many of the largest exchanges and investment banks operate on systems built by Risk Focus. The firm's practices include Custom Application Development, Regulatory Reporting & Compliance, DevOps & Cloud, Streaming Architectures, and IT Strategy. It is a Premier Confluent Systems Integrator and an Advanced AWS Consulting Partner with DevOps and Financial Services Competencies. Clients count on Risk Focus to provide outcomes that advance their objectives on time and on budget.

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