Confluent PoC for Sainsbury's

Confluent Platform at the edge

1. Prepared and Reviewed by

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2. Abstract

This document describes the agreed purpose, scope, tests, and success criteria of the Proof of Concept to be performed by **Confluent** and **Sainsbury's** during the months of **March and April/2025**.

Sainsbury's is modernising the core infrastructure using Azure Local within the store network. The first use-case is to integrate the Emerald (tills) and Catalina (payment processing and Nectar voucher generation), whereupon any item is transacted on the tills a UDP/IP message is sent by the Emerald/till to Catalina. There is a hard requirement to have a more resilient solution and decouple the two systems, as well as < 1s processing.

The purpose of this PoC is to test the introduction of Kafka on the Edge, deployed at their local stores. As there are 1,600 stores, Sainsbury's wants a more compact and easier to manage solution. For that, the suggested idea is to use Confluent Platform Edge.

The POC is intended to start 17th March and run until 18th April and will be run by the Sainsbury's engineering team, with technical support from Confluent via a weekly call. Assumption is that Sainsbury's team is familiar with Confluent. Some ad-hoc troubleshooting may be required, Confluent will provide YAML & step-by-step guide.

A POC playback meeting will be scheduled w/c 21st April with key stakeholders & to discuss next steps to roll out into production & commercial discussions. If the POC is successful, Sainsbury's are expecting to roll out the pilot platform by August 2025, with testing activity happening beforehand.

3. Proof of Concept Description

3.1 Background

The current store infrastructure is 15+ years old and there is a full hardware & software refresh. The primary drivers are cost savins & ensuring offline resilience. Microsoft Azure Stack HCI has been chosen as the platform, with 1,445 stores in scope to be delivered by August 2025 (200 stores per month). The app layer is still being decided upon, but Kafka at the Edge is deemed a critical event service connecting stores to central applications.

3.2 Business Problem

Sainsbury's are looking for a performant, reusable & resilient method of integrating apps & services running in store with central components. For example, Sainsbury's are looking to connect the Emerald tills platform provided by NCR with a Catalina service for producing printed vouchers. It's essential this service has sub-second end to end latency, as the customer experience would be impacted by any longer waiting time.

Other use-cases discussed have been:

- Shrink Video Analytics (Nudge Messages)

- Colleague Discount Service

- Nectar Prices (Loyalty)

4. Goals

4.1 Critical Success Criteria

4.1.1 Business
- Cost effective platform that fits with wider integration estate

- Technology framework that can be used for other in store use-cases (reusability to avoid engineering teams managing different tools)

- Simplified developer experience within the integration platform - abstracting complexity away from engineers

4.1.2 Technical
- End to end monitoring at scale

- Sub-second end to end P99 latency between Emerald and Catalina

- Confluent Platform (Kafka) to handle peaks of up to 15MB/s of total throughout without P99 latency degradation

- ACLs to access control the Kafka topics

- Efficient resource usage of underlying Azure Local platform & Edge compute resources

5. Risks

- **Scope**: Validation of Sainsbury's success criteria

- **Buy in**: Unclear on Sainsbury's executive sponsor(s) & interested stakeholders (Ceri, Lorraine, Leo, Asad)

- **Time**: Potential Easter holiday challenges. Additional and unknown CP CRD configuration/tweaks required when deploying on AKS / Stack HCI, although it is fully compatible with AKS

- **Support**: No dedicated professional services support - is this needed/ budgeted?

- Post POC actions & next steps currently undecided

- Tactical solution

- **Business**: TBD

6. POC Solution
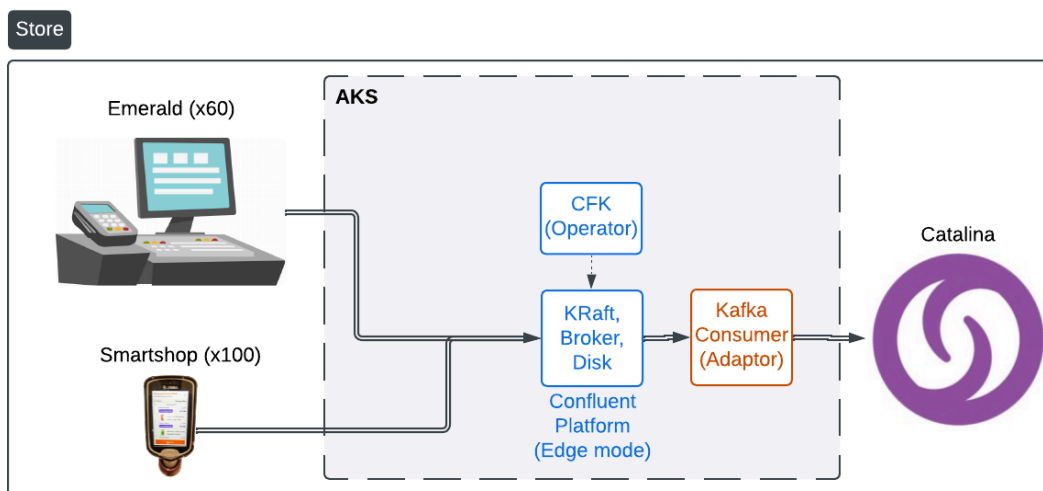
There will be no connection (Replicator/CL) between the Central Cloud (Confluent Cloud) and the Store (Confluent Platform Edge).

In a second moment, out of the scope of the PoC, it is expected to on-board IoT use cases. Several devices on the store submitting sensor measurements to be processed/analysed either in the store or in the cloud. It is not yet confirmed whether sensors might communicate directly to Kafka or through a REST API gateway or MQTT broker.

7. POC Technical Environment

7.1 Confluent Platform Environment Details

Confluent Product	Confluent Platform
Deployment	On-prem/K8s using Azure Stack HCI

7.2 POC Components

7.2.1 Confluent Components

Confluent Component	Version	Platform	Comments
Confluent for Kubernetes (CfK)	2.1.1	Azure Stack HCI	Under the CP-Edge licencing model
Confluent Platform (KRaft, Broker)	7.9.0	Azure Stack HCI	Under the CP-Edge licencing model

7.2.2 Third party components

3rd-party Component	Version	Platform	Comments
Java	17		
Emerald			
Catalina			

7.3 PoC Requirements

- No more than 60 devices (including Emerald/tills, Catalina and Smartshop devices)
- Each device will produce to a separate topic
- TPS (peak): 1,000~2,000
- Write (peak): 1~2MB/s
- Fanout 1:1
- CP K8s pod
    - Embedded REST (v3). No REST Proxy (producers/consumers to use the Kafka protocol)
    - No C3, ksqlDB, and Schema Registry
    - High-Available Kafka Cluster 3x Kraft + 3x Confluent Servers on v7.9.0 (or latest)
        - KRaft: 4 VCPU, 8GB RAM, 1TB disk
        - Broker: 4 VCPU, 16GB RAM, 5TB disk
        - Persistent storage, depending on a suitable Storage class
    - One single cluster, no DR
    - Single namespace containing the CfK Operator and the CP pod
    - Separate namespace for monitoring (and potentially other agents Sainsbury's may want to deploy)
    - Self-signed TLS (auto-generated certs)
        - SASL_PLAINTEXT inside the pod (for CONTROLLER and REPLICATION listeners)
        - SASL_SSL outside the pod (for EXTERNAL listener)
        - SSL for Embedded REST (v3)
        - No SSL certificate rotation
    - File-based user creds store (SASL_SSL with basic creds for external AuthN)
    - Kafka ACLs, but no Confluent RBACs
    - JMX exporter for Prometheus
    - No need for the Confluent Metrics/Telemetry Reporter

8. POC Schedule

Date	Action(s)	Owner
	Provide CP's CRD/YAML file	Confluent
	Deploy CP in Azure HCI	Sainsbury's
17/March/2025	Start PoC	Sainsbury's/Confluent
	Review PoC Success Criteria	Sainsbury's/Confluent

Date	Action(s)	Owner
18/April/2025	End PoC	Sainsbury's/Confluent
21/April/2025	PoC Playback	Sainsbury's/Confluent

9. Stakeholders Confirmation

By listing my name below, I agree that the POC specifications in this document are the POC requirements as defined by Sainsbury's and Confluent. This is not a contract, but rather a document to ensure shared understanding of the scope and objectives of the POC.

Name	Role	Email

10. References

Deploy and Manage Confluent Platform Using Confluent for Kubernetes:
https://docs.confluent.io/operator/current/overview.html

Confluent for Kubernetes API Reference (2.11):
https://docs.confluent.io/operator/current/co-api.html

KRaft Overview for Confluent Platform:
https://docs.confluent.io/platform/current/kafka-metadata/kraft.html

Monitoring Your Event Streams: Integrating Confluent with Prometheus and Grafana:
https://www.confluent.io/en-gb/blog/monitor-kafka-clusters-with-prometheus-grafana-and-confluent/

11. Appendix

CRDs and instructions are available at a private Github Repository (https://github.com/ifnesi/edge-cp). To have access granted to it, please provide your Github username to inesi@confluent.io.