

Formula 1 telemetry processing using Kafka and Camel

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Xbox F1 2020 Game Driver



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F1 2020 Game Driver @Home
Playing on Xbox

Building an events stream pipeline:

- ▶ How to ingest events reliably
- ▶ How to integrate with different systems for events ingestion (UDP) and providing output
- ▶ How to process events in real time
- ▶ How to show useful insights
- ▶ How to run and deploy the entire pipeline

What is Apache Kafka

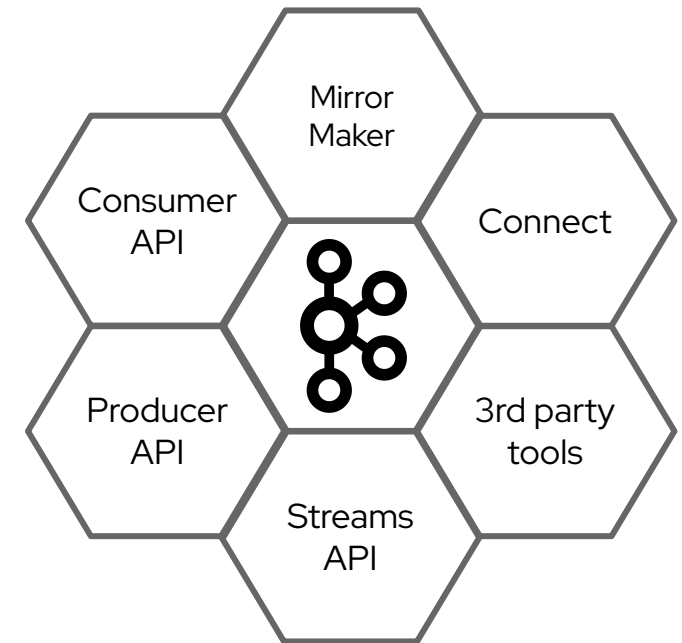
“ ... a publish/subscribe messaging system ...”

“ ... a streaming data platform ...”

“ ... a distributed, horizontally-scalable, fault-tolerant, commit log ...”

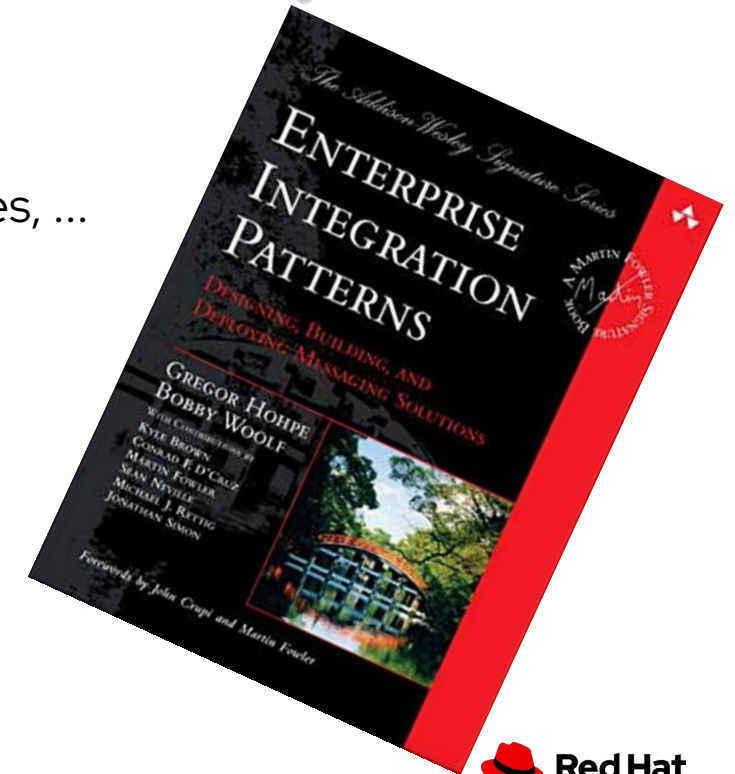
What is Apache Kafka

- ▶ Designed to be fast, scalable, durable and available
- ▶ Distributed by nature
- ▶ Data partitioning (sharding)
- ▶ High throughput / low latency
- ▶ Broader ecosystem more than just the broker
- ▶ Kafka Streams API for real-time event processing

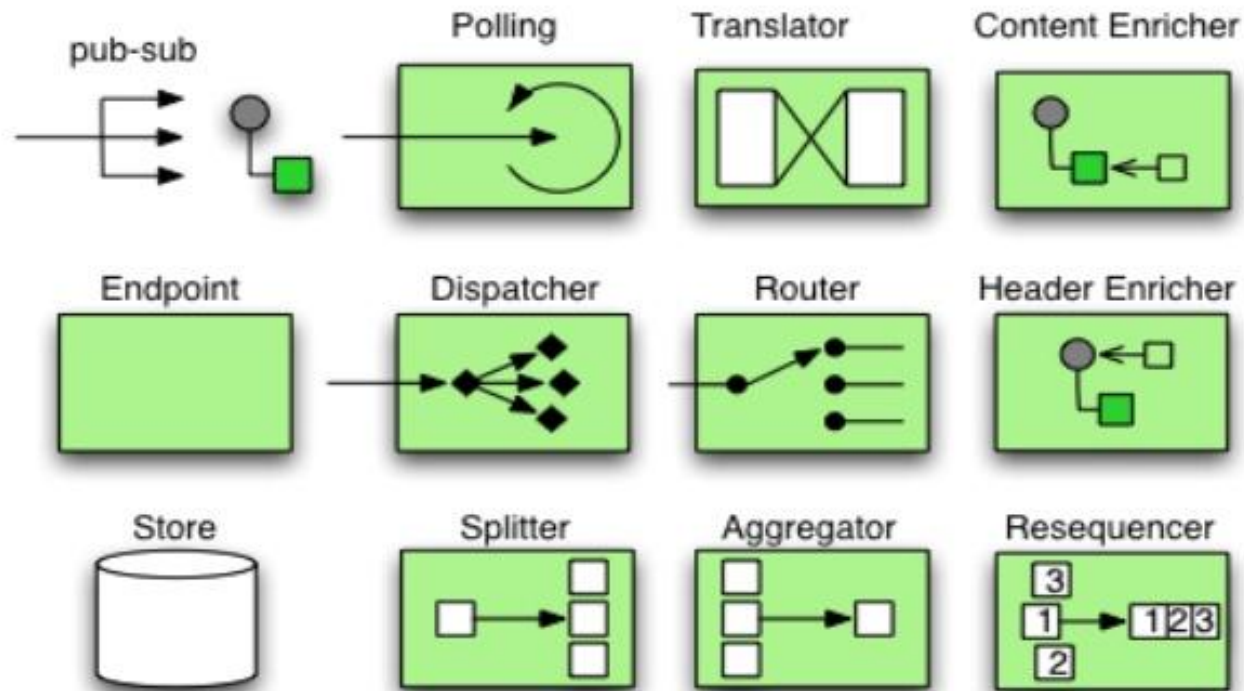


What is Apache Camel

- ▶ The swiss knife of integration
- ▶ Java based integration framework
- ▶ Based on Enterprise Integration Pattern
- ▶ Comes with 300+ components
 - UDP, HTTP, MQTT, AMQP, InfluxDB, AWS & Azure services, ...
- ▶ DSL to describe the integration flow ... aka "route"

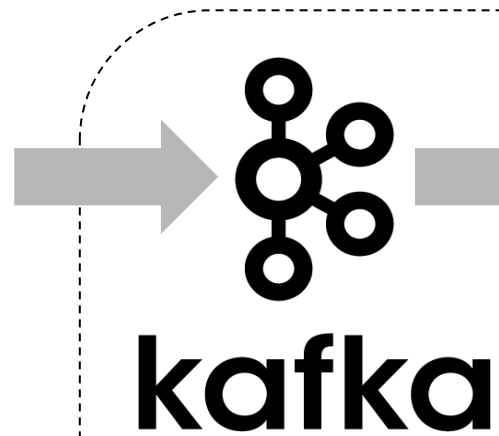
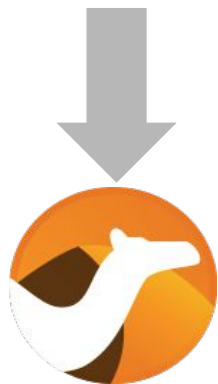


Enterprise Integration Patterns

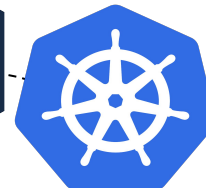


What is Strimzi

- ▶ Open source project licensed under Apache License 2.0
- ▶ Focuses on running Apache Kafka on Kubernetes
 - Container images for Apache Kafka, Apache ZooKeeper and other components
 - Operators for deploying, managing and configuring Kafka clusters
- ▶ Provides a Kubernetes-native experience
 - Not only Kafka clusters, but also users, topics and the rest of Kafka ecosystem
- ▶ CNCF sandbox project since September 2019

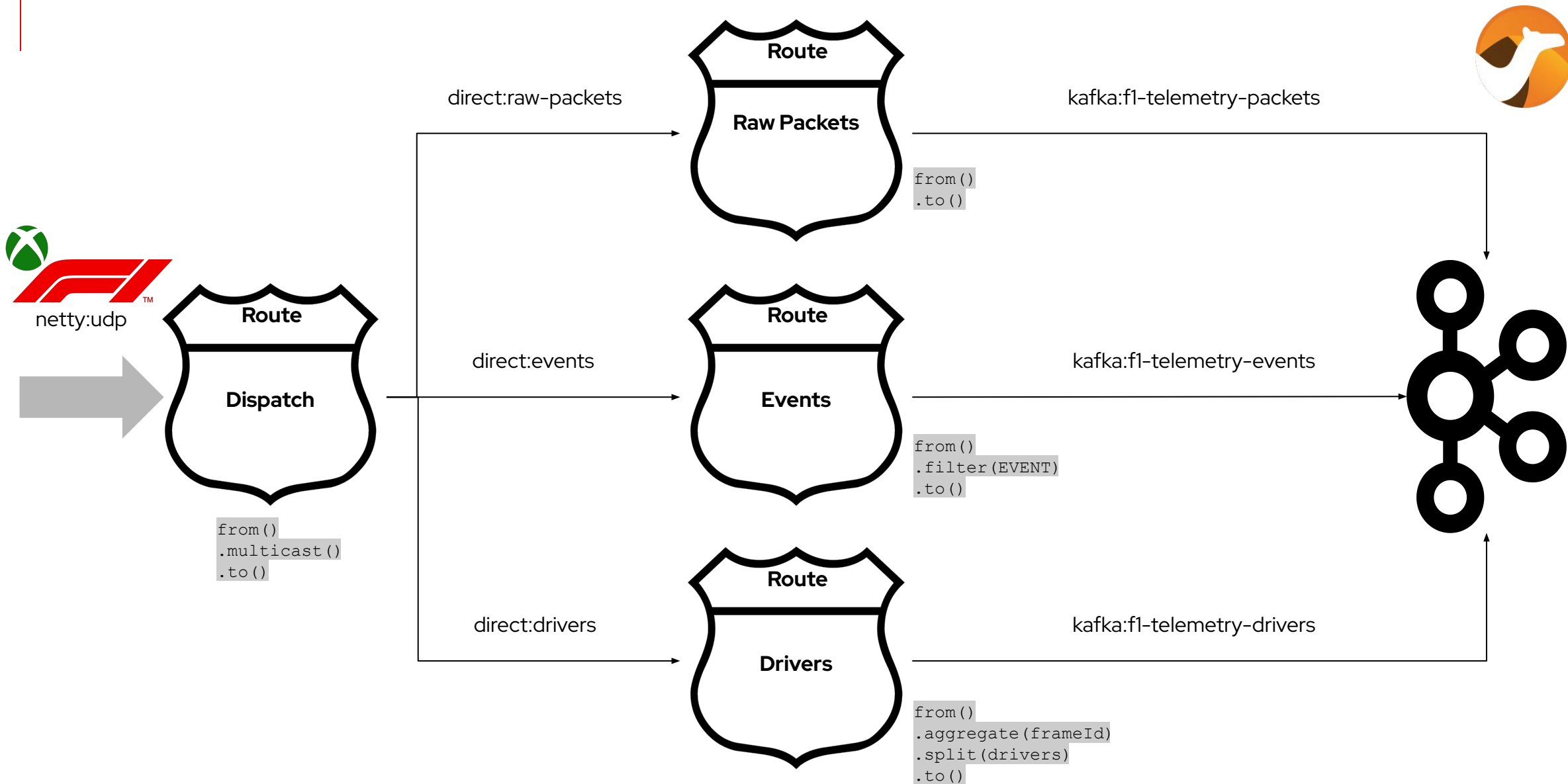


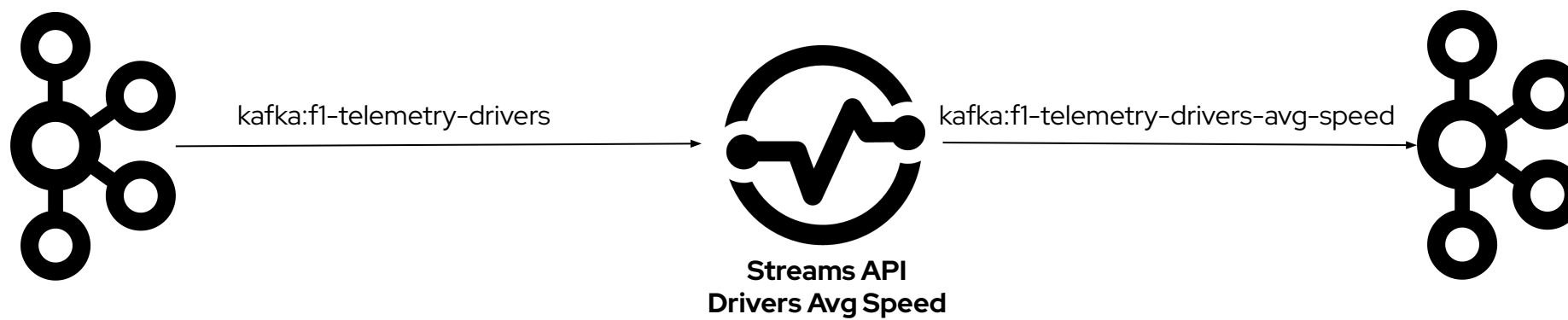
influxdb

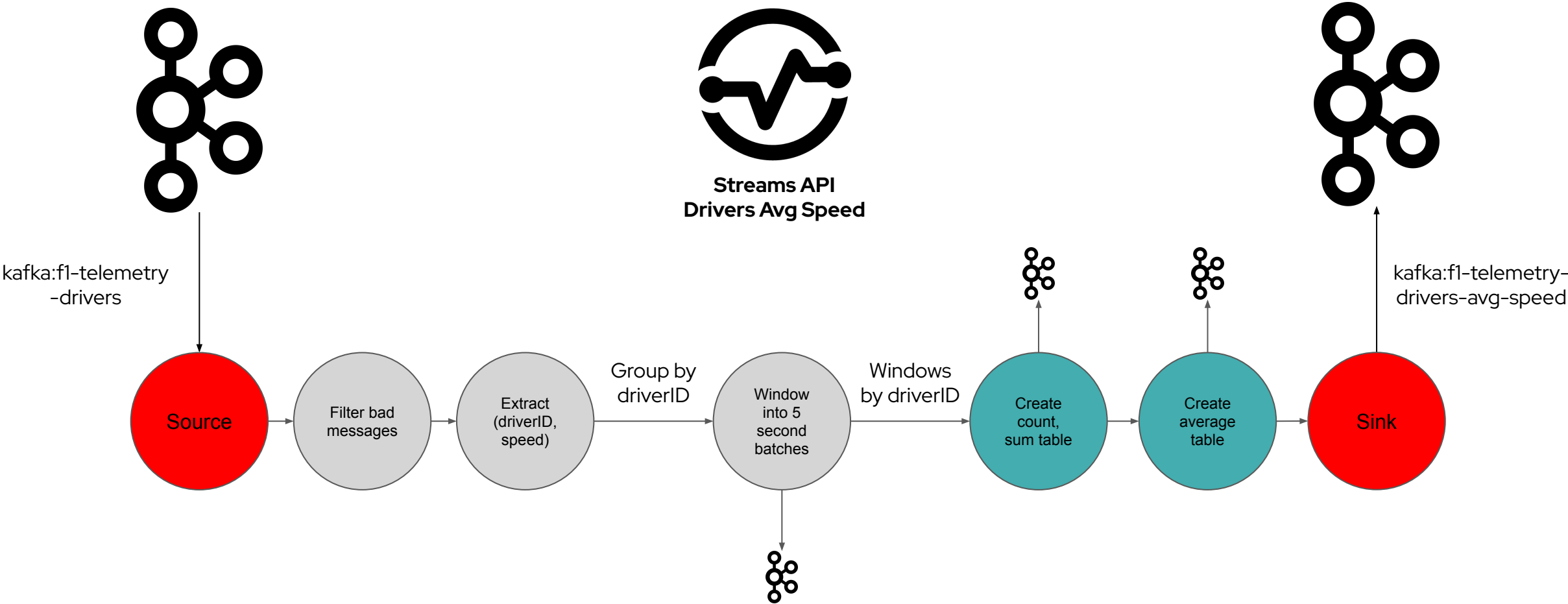


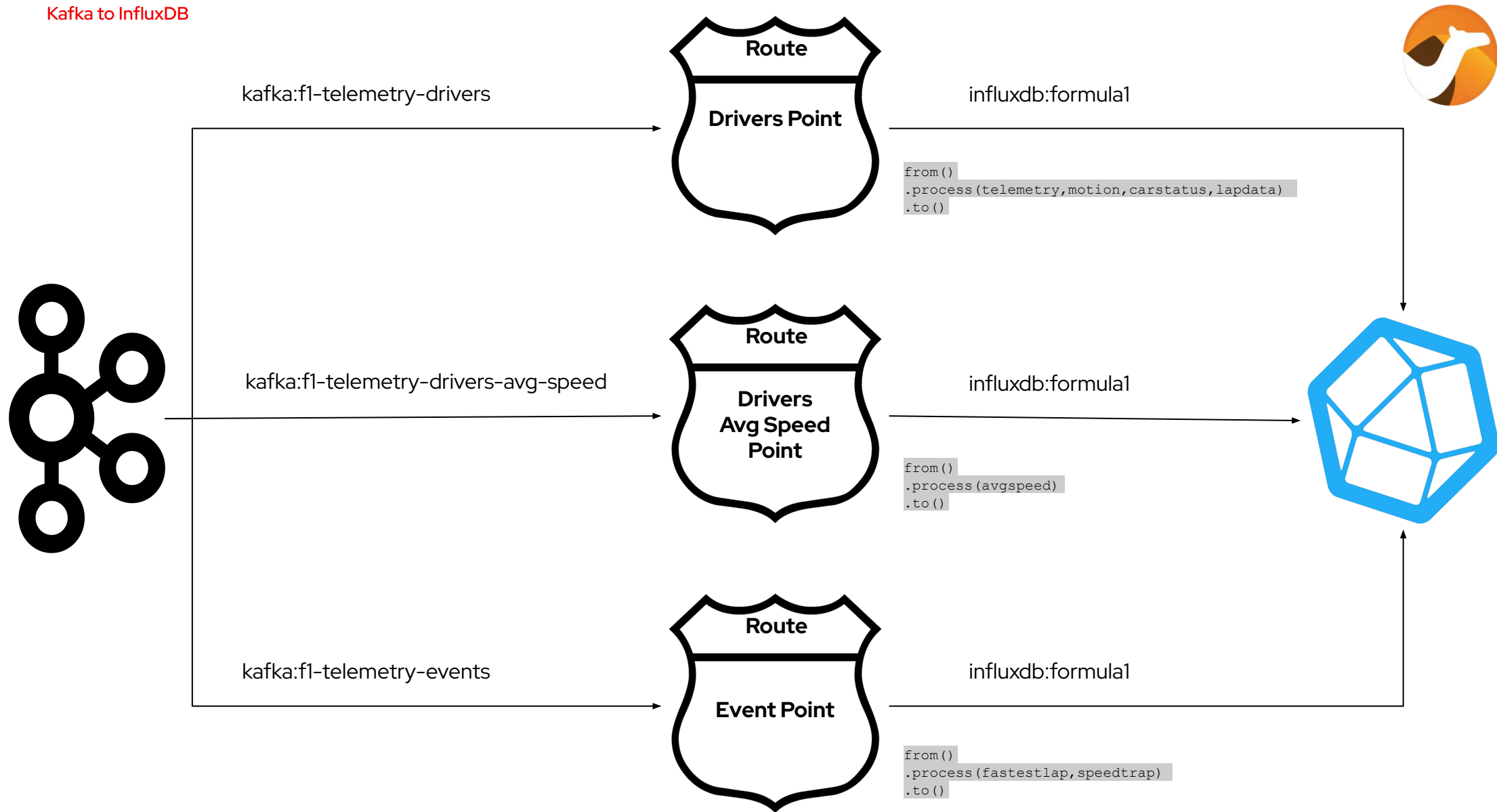
Grafana











Demo

Resources:

- ▶ Blog post: <https://grafana.com/blog/2021/02/02/real-time-monitoring-of-formula-1-telemetry-data-on-kubernetes-with-grafana-apache-kafka-and-strimzi/>
- ▶ F1 decoding library: <https://github.com/ppatierno/formula1-telemetry>
- ▶ F1 Kafka project: <https://github.com/ppatierno/formula1-telemetry-kafka>
- ▶ Video demo: <https://www.youtube.com/watch?v=Re9LOAYZi2A>

- ▶ F1 2020 Codemasters game provides telemetry packets on UDP
 - [Specification is available online](#)
- ▶ [Kubernetes](#) / [OpenShift](#)
 - Deploying the [Apache Kafka](#) cluster through [Strimzi](#) project
 - Running Apache Camel applications, InfluxDB and Grafana
- ▶ [Apache Camel](#)
 - Ingesting telemetry packets to Apache Kafka
 - Gets telemetry data and race events from Apache Kafka; store into InfluxDB
- ▶ [InfluxDB](#)
 - Time-series database to provide data to Grafana
- ▶ [Grafana](#)
 - Showing all telemetry and events on specific dashboards

Thanks!

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