WEATHER
CONTAMINATION
ALICE
CMS

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VENTILATION
layer
API
providing an
and Kafka permits

Utilizing a bi-directional connector between WinCC OA
and Kafka permits communication with any RoT
layer having Kafka connecting capability.

Kafka Connect (8)

Kafka Connect is an open-source framework
providing an API for building Kafka connectors.
Connectors can either take data from a Data Source
and push it into a Kafka cluster or pull the data from a
Kafka cluster into a Data Sink.

Available Connectors:
- mongoDB
- instantDB
- elasticsearch
- MTT
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Kafka @ CERN (7)

CERN IT and Beams Departments operate Kafka
clusters used by NXS (Next CERN Accelerator
Logging Service, Beams Department, IT Security
Event Operations, CERN Data Centre Infrastructure
Monitoring (IT Department) and REMUS.

The Kafka Cluster used by REMUS is available from
CERN General Purpose Network and CERN
Technical Network.

Kafka & Industrial IoT (6)

REMUS Data Streaming infrastructure allowed
for a Secured, Reliable and Scalable near-
time data source.

Latency of less than 1 second between the
data acquisition from the distributed
instrumentation, the stream processing and the
near-real-time display of measurements in
CERN Control Rooms.

In operation since March 2019 in CERN
Control Rooms with 100% Availability.

Data Visualization Tools for Control Rooms (1)

Web & Mobile (2)

The streams of data generated from REMUS are exploited by a
responsive web application. REMUS Web, able to display
measurements in near real-time, among other information about the
SCADA processes.

Web-based applications such as Grafana or
Chronograf provide data visualization
and analytics tools out-of-the-box.

Automatic generation of QR Codes from
the web interface provides a fast, user-
friendly yet secure way for accessing
near real-time data from any terminal
device having internet connectivity.

Access to the web application is protected by the
CERN SSO - Single Sign On - service.

Kafka Streams (3)

REMUS relies on Kafka
Streams (released in 2016) for its Stream Processing
functionalities.

Kafka Streams provides
Exactly Once semantics and benefits from Kafka
scalable and distributed
architecture advantages.

Link with External Control Systems (4)

The wide adoption of Apache
Kafka as a solution for
Asynchronous Data Streaming
opened up possibilities for
REMUS to communicate with
external SCADA systems based on
different technologies such as
Tango, EPICS, WinCC OA etc.

WinCC OA To Kafka (5)

All Measurements retrieved by the REMUS supervisory system are
published in near-real time through Kafka, in a dedicated Kafka Topic.

Write access to REMUS Kafka
Topics is secured through
TLS Encryption and
Kerberos Authentication.

REMUS contains 3,300
publication tags, sending
about 600 messages per
second to CERN Kafka
brokers.

REMUS Web

Web Application

CERN General Network

CERN Technical Network

Through Kafka

Ingest

Storage

Web Application

CERN General Network

CERN Technical Network

WINCC OA TO KAFKA

Web & Mobile

WinCC OA & Kafka Connect

CERN Control Rooms

Data Visualization

Web Applications

Kafka Connect

Kafka Streams

WinCC OA

Kafka

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