

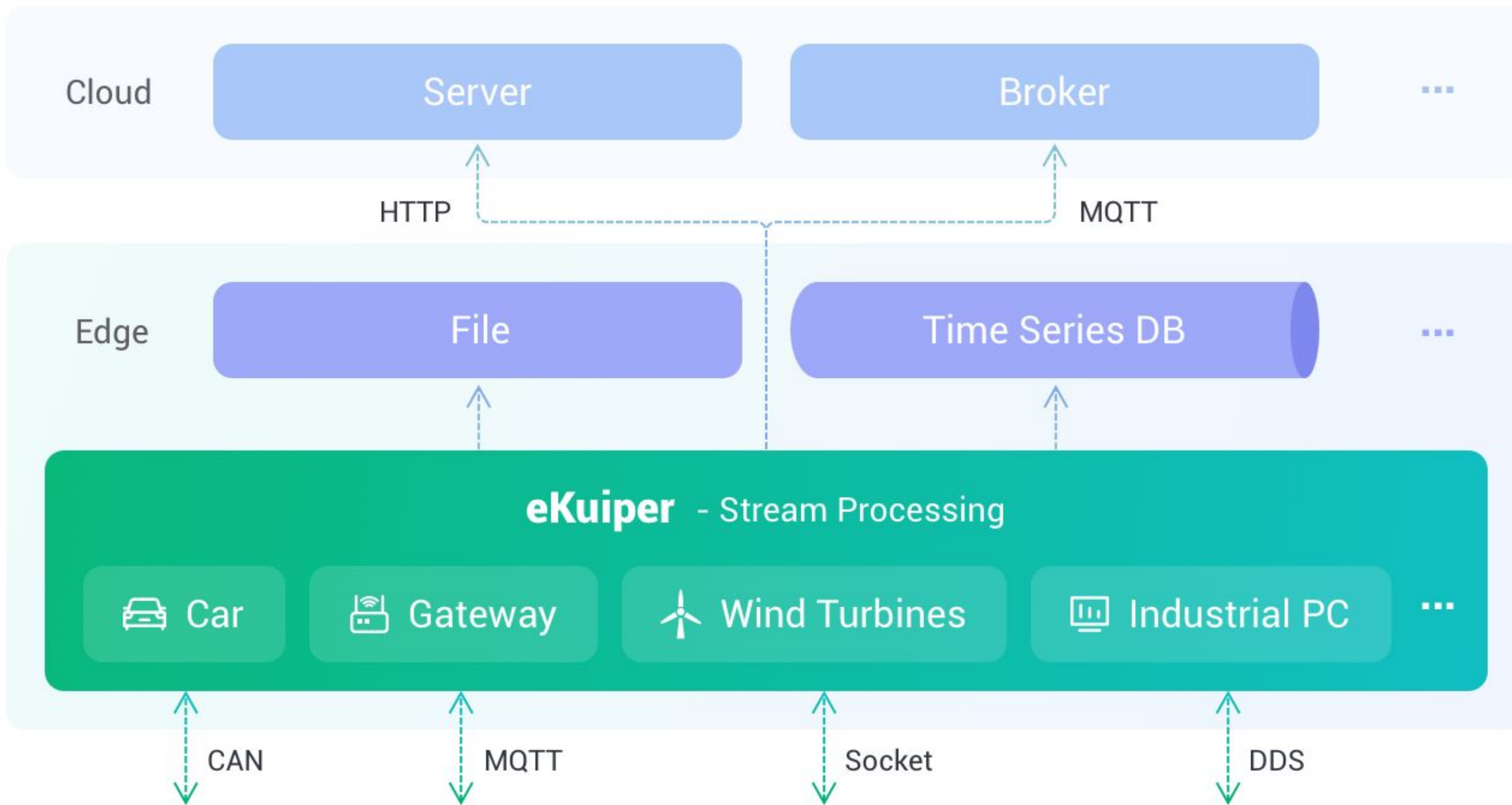
# LF Edge eKuiper Overview

Open Source Edge Stream Processing Engine

Jiyong Huang · 2022-06

# What is eKuiper

LF Edge Stage 1 Project  
Low latency, More data security, Less bandwidth usage



### Lightweight:

10 MB footprint, small enough to run on edge gateway or even edge devices

### Fast:

Processing just near the data source: low latency  
general-purpose computing, large throughput  
Supports 11K TPS on Raspberry Pi 3B+; simultaneous computation of multiple rules can support more than 50K times of calculation per second

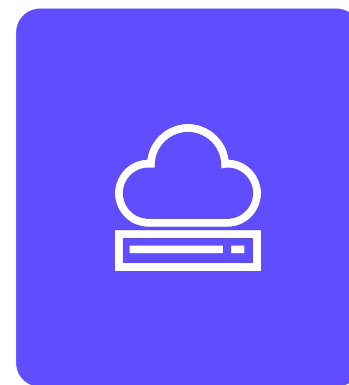
### Integration:

connecting the various protocols of the North and South Bridges

### Evolvable:

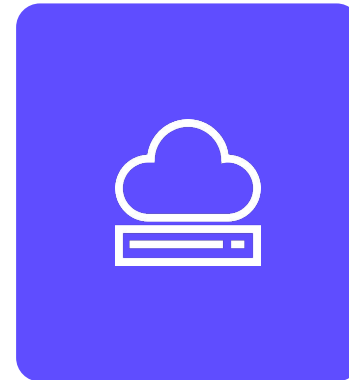
Highly extensible, easily adaptable to external ecologies and algorithms

# Features



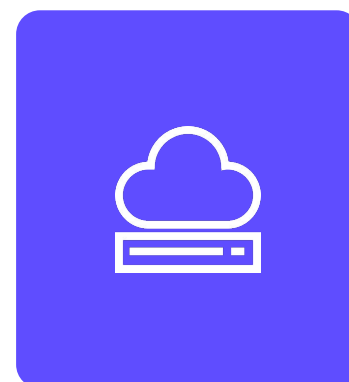
## SQL based analytics

Declarative SQL instead of imperative coding  
Standard SQL with multi-stream JOIN operation support, 60+ built-in functions including math, character processing and encoding; 5 types of time windows support



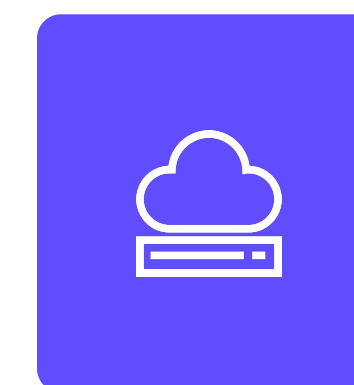
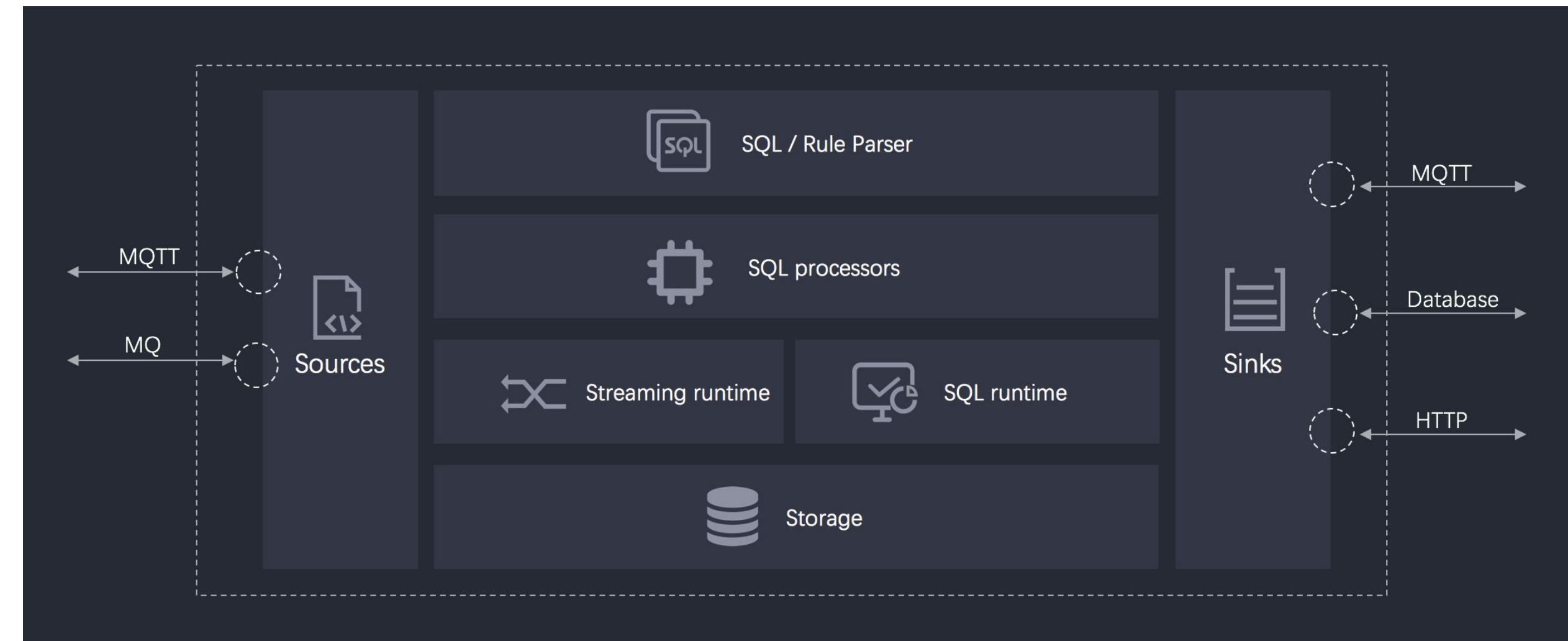
## Rich Ecosystem

Built-in source & sink support for MQTT, EdgeX Foundry, Http etc.  
Deploy cross CPU and OS



## AI & Extension

Allow to extend source, sink and UDF with multiple languages.  
Integrate machine learning algorithms and run against streaming data



## Cloud Native Deployment

Integrate with K3S, Beatyl, KubeEdge and OpenYurt

# Quick Start

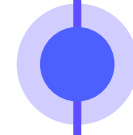
Take Docker as an example, access the MQTT data stream, calculate the average temperature value every 10 seconds, and send the result to the result MQTT topic



## Quick start

Take docker as an example. Also supports binaries, k8s etc.

```
docker run -p 9081:9081 -d --name kuiper -e
MQTT_SOURCE__DEFAULT__SERVER="tcp://broker.emqx.io:1883"
lfedge/ekuiper:1.5-slim
```



## Create the stream

By REST or CLI

```
create stream demo () WITH (FORMAT="JSON", DATASOURCE="inputTopic", SHARED="true")
```



## Create the rule

By REST or CLI

```
{
  "sql": "SELECT avg(temperature) as
avgTemperature FROM demo GROUP BY TumblingWindow(ss,10)",
  "actions": [{"mqtt": {"server":
"tcp://broker.emqx.io:1883", "topic": "result"}}]}
}
```

# Usage Scenarios

Application areas: manufacturing, automotive networking, oil, power, etc.

## Data Transformation

Data cleaning, heterogeneous data normalization, data format conversion, etc.

## Real-time Aggregation

Aggregate analysis based on time windows, such as statistical sums by time period

## Filter and alert

Filter data or trigger alerts based on rules

## Materialization

Continuous storage of calculation results in close proximity

## Message Routing

Linking heterogeneous messaging systems, routing based on rule results

## Stream/Batch processing

Connect stream tables for data completion, filtering, etc.

## Binary data processing

Real-time image processing, such as creating thumbnails

## AI Inference

AI inference on streaming data in real time

# Shennan Circuits - Smart Factory

## Factory Equipment Data Collection and Product Quality Traceability



### Scenarios & Business Requirements

SCC is a PCB R&D and manufacturing high-tech enterprise with many production processes and more than 200 sets of PLC equipment working together to complete the production control tasks. The factory needs to realize the control functions such as loading/unloading of equipments, inter-process coordination; and high frequency collection and storage of production data to for product quality traceability.

### Pain Points

- The ability to collect data in real time from various manufacturers and models of PLCs.
- Lack of data cleaning and analysis capability at the edge end, massive storage of production data, time-consuming and labor-intensive product quality traceability analysis.

### Solution

- Neuron realizes real-time data acquisition  $\geq 100\text{ms}$  for all kinds of PLC equipment on site
- Deploy eKuiper edge streaming analysis engine on site to filter and process the real-time data stream collected by Neuron according to the rule setting, and push the results to EMQ X Enterprise, which reduces the pressure of back-end data storage and strengthens product quality traceability through eKuiper's filtering of data.

# Three Gorges Group

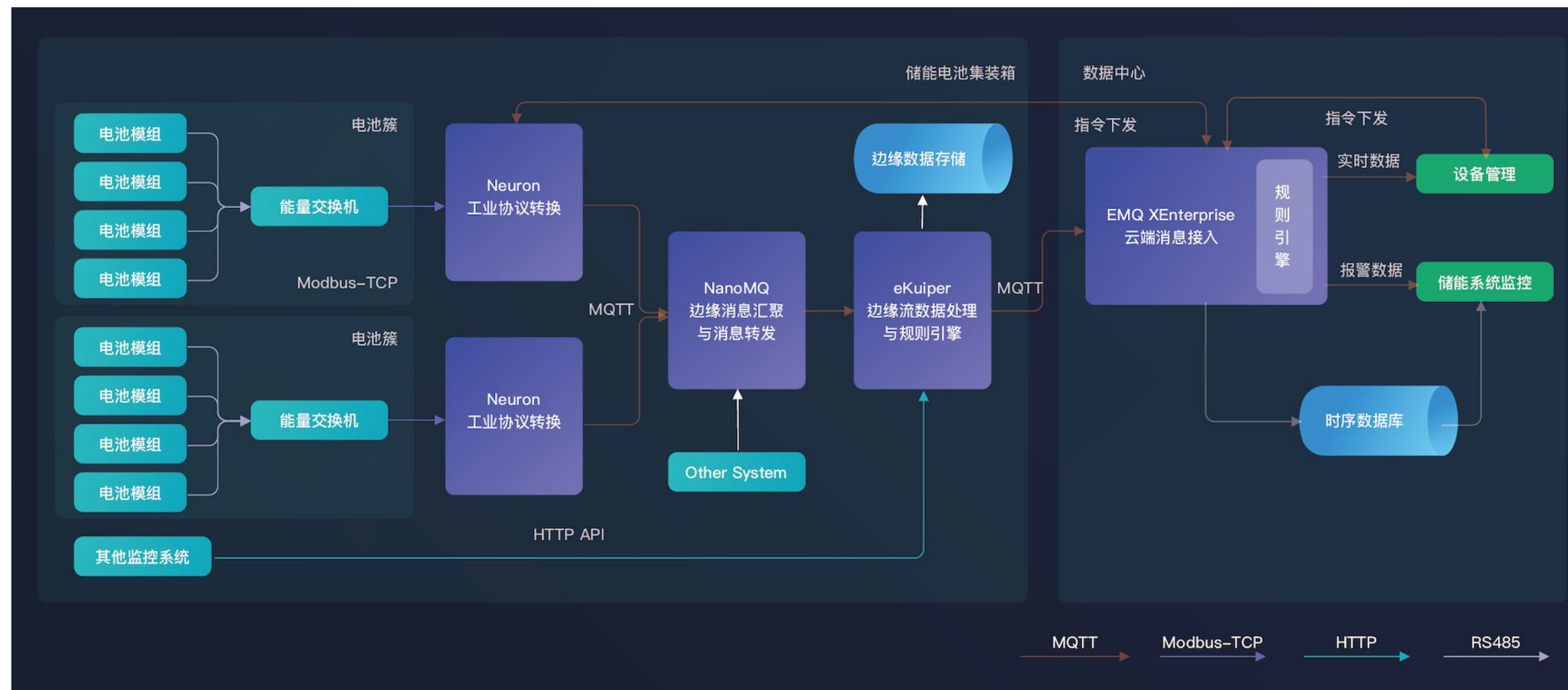
## New Energy Storage Equipment Data Monitoring

### Scenario

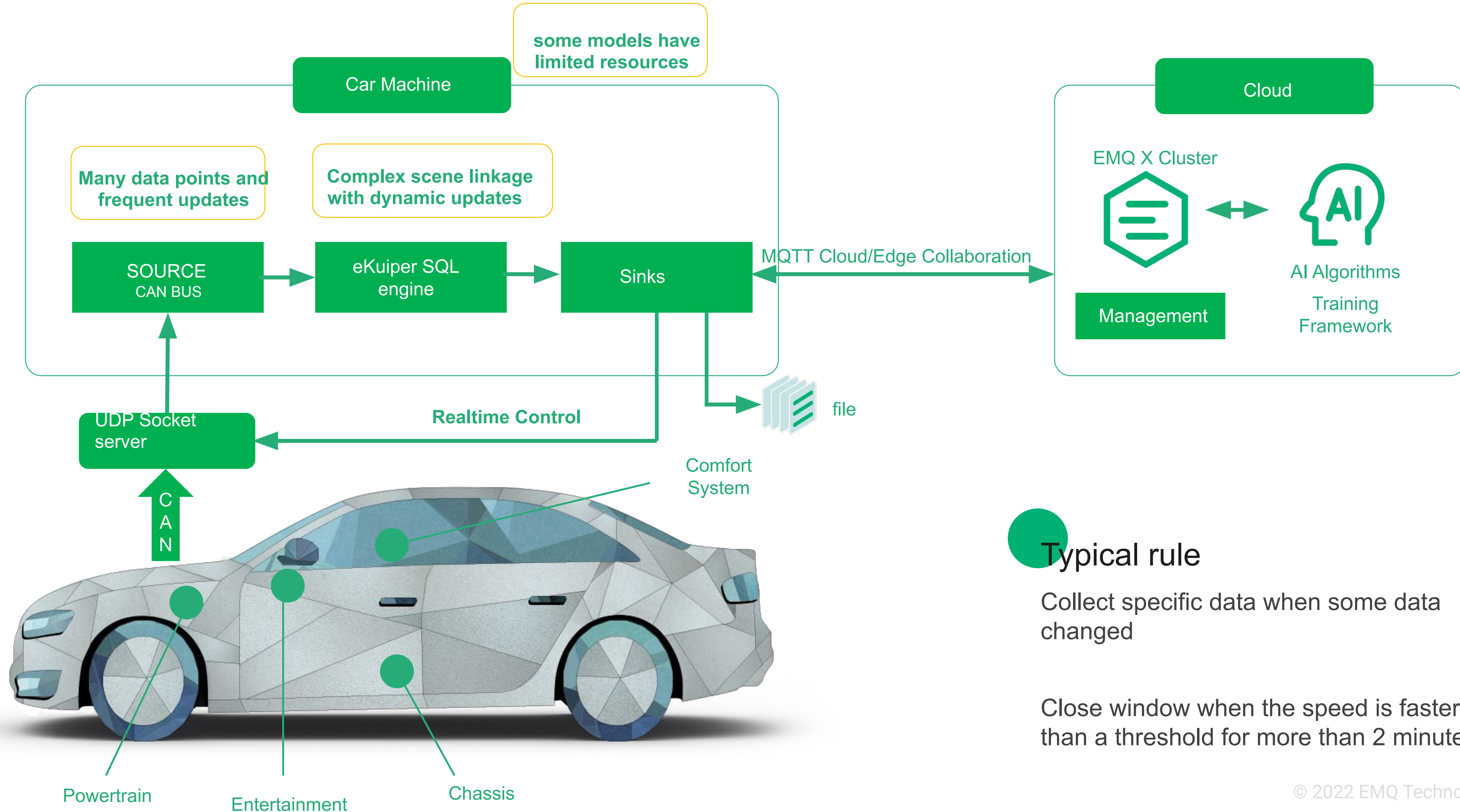
Intelligent management, safety monitoring and environmental monitoring of energy storage equipment and systems in the process of construction and operation management of large hydropower, wind power and photovoltaic power generation projects. Improve production management accuracy.

### Solution

- Real-time and efficient collection of energy storage data
- Real-time data edge processing
- Cloud aggregation for flexible docking applications
- Cloud-side collaboration, remote management



# Telematics scenario: car rule engine



## Typical rule

Collect specific data when some data changed

Close window when the speed is faster than a threshold for more than 2 minutes



# THANKS

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