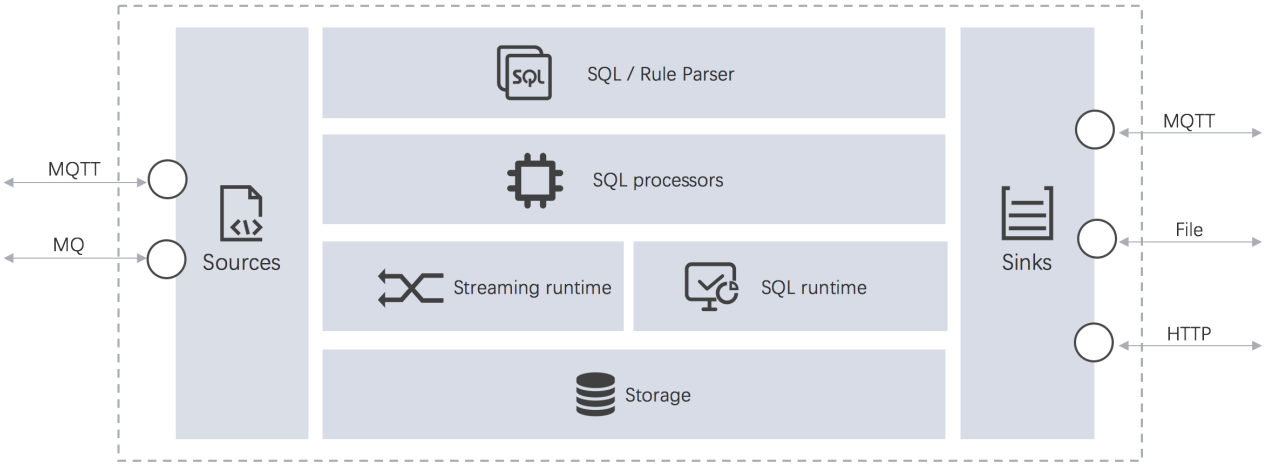
eKuiper

Welcome to the eKuiper Wiki

Overview

eKuiper is an edge lightweight IoT data analytics / streaming software implemented by Golang, and it can be run at all kinds of resource constrained edge devices. One goal of eKuiper is to migrate the cloud streaming software frameworks (such as Apache SparkApache Storm and Apache Flink) to edge side. eKuiper references these cloud streaming frameworks, and also considered special requirement of edge analytics, and introduced **rule engine**, which is based on `Source`, `SQL (business logic)` and `Sink`, rule engine is used for developing streaming applications at edge side.



User scenarios

It can be run at various IoT edge use scenarios, such as real-time processing of production line data in the IIoT; Gateway of Connected Vehicle analyze the data from data-bus in real time; Real-time analysis of urban facility data in smart city scenarios. eKuiper processing at the edge can reduce system response latency, save network bandwidth and storage costs, and improve system security.

Features

- Lightweight
    - Core server package is only about 4.5M, initial memory footprint is about 10MB
- Cross-platform
    - CPU ArchX86 AMD * 32, X86 AMD * 64; ARM * 32, ARM * 64; PPC
    - The popular Linux distributions, OpenWrt Linux, MacOS and Docker
    - Industrial PC, Raspberry Pi, industrial gateway, home gateway, MEC edge cloud server
- Data analysis support
    - Support data extract, transform and filter through SQL
    - Data order, group, aggregation and join
    - 60+ functions, includes mathematical, string, aggregate and hash etc

    - 4 time windows & count window
- Highly extensibile

  Plugin system is provided, and it supports to extend at `Source`, `SQL functions` and `Sink`.

    - Source: embedded support for MQTT, and provide extension points for sources
    - Sink: embedded support for MQTT and HTTP, and provide extension points for sinks
    - UDF functions: embedded support for 60+ functions, and provide extension points for SQL functions
- Management

    - A web based management dashboard for nodes, plugins, streams & rules management
    - Plugins, streams and rules management through CLI & REST API
    - Easily be integrate with KubeEdge, K3s and Baetyl, which bases Kubernetes
- Integration with EMQ X Edge

  Seamless integration with EMQ X Neuron & EMQ X Edge, and provided an end to end solution from messaging to analytics.

Quick Start

- eKuiper 5 minutes quick start
- EdgeX rule engine tutorial

Performance Test Result

MQTT throughput test

- Using JMeter MQTT plugin to send simulation data to EMQ X Broker, such as: `{"temperature": 10, "humidity" : 90}`, the value of temperature and humidity are random integer between 0 - 100.
- eKuiper subscribe from EMQ X Broker, and analyze data with SQL: `SELECT * FROM demo WHERE temperature > 50`
- The analysis result are wrote to local file by using file sink plugin.

Devices	Message # per second	CPU usage	Memory usage
Raspberry Pi 3B+	12k	sys+user: 70%	20M
AWS t2.micro(1 Core * 1 GB) Ubuntu18.04	10k	sys+user: 25%	20M

EdgeX throughput test

- A Go application is wrote to send data to ZeroMQ message bus, the data is as following.

```
{
  "Device": "demo", "Created": 000, …
  "readings":
  [
     {"Name": "Temperature", value: "30", "Created":123 …},
     {"Name": "Humidity", value: "20", "Created":456 …}
  ]
}
```

- eKuiper subscribe from EdgeX ZeroMQ message bus, and analyze data with SQL: `SELECT * FROM demo WHERE temperature > 50`. 90% of data will be filtered by the rule.
- The analysis result are sent to nop sink, all of the result data will be ignored.

	Message # per second	CPU usage	Memory usage
AWS t2.micro(1 Core * 1 GB) Ubuntu18.04	11.4 k	sys+user: 75%	32M

Max number of rules support

- 8000 rules with 800 message/second
- Configurations
    - 2 core * 4GB memory in AWS
    - Ubuntu
- Resource usage
    - Memory: 89% ~ 72%
    - CPU: 25%
    - 400KB - 500KB / rule
- Rule

- Source: MQTT
- SQL: SELECT temperature FROM source WHERE temperature > 20 (90% data are filtered)
- Sink: Log

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Recent space activity

Kendall Perez

2022 June updated about an hour ago • view change

JiYong Huang

2022 July created about 12 hours ago

2022 June updated Jun 24, 2022 • view change

Feature 1289 Data Caching Mechanism updated Jun 16, 2022 • view change

TSC 2022-06-14 updated Jun 14, 2022 • view change

Links

- eKuiper on GitHub
- eKuiper Documentation
- eKuiper Slack: Join lf-edge, and then join ekuiper or ekuiper-user channel.
- Join LF Edge