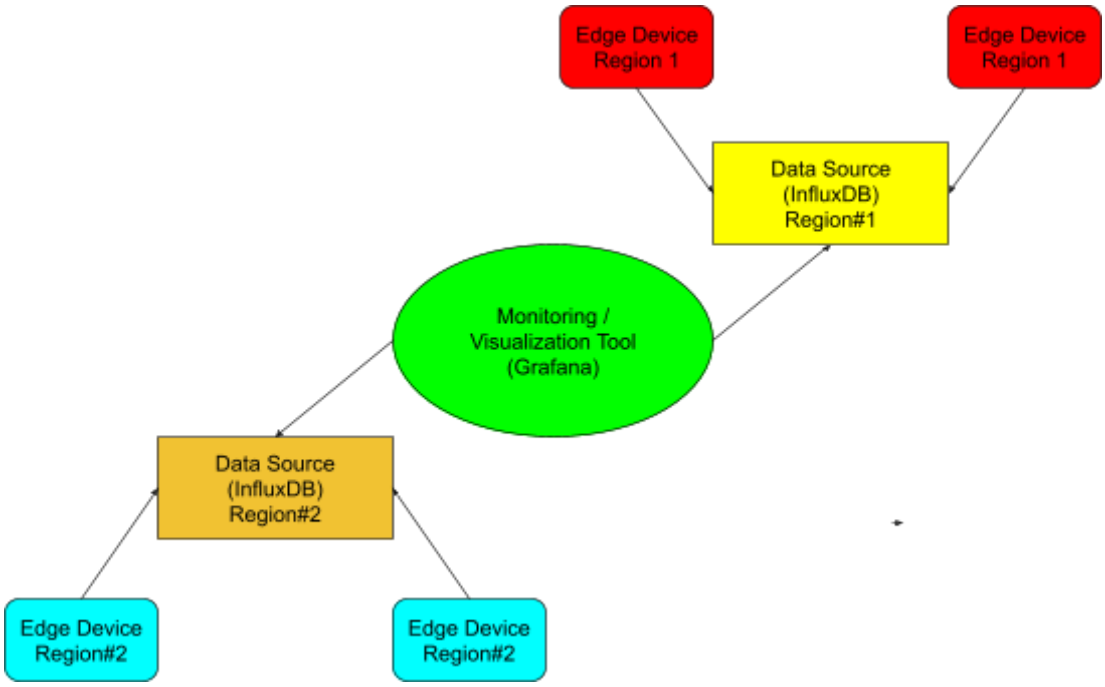
Edge Device Hardware Monitoring Tool - Design Document



Design Explanation

The project has three components:

1. Edge device: "data_collection_transfer" component.
    - A docker container (running ubuntu 22.04) with a bash script that will run every 60 seconds to collect system metrics and transfer them to an external data source.
    - Deployment can be done through GreenGrass by deploying the script to all edge nodes or deploying the docker container.

2. External DataSource: "data_source" component.
    - I believe the best option is to use a streaming (Kafka), queue system (mosquitto) or a time-series DB. Sending metrics as a file can be un-reliable specially if the data transfer frequency is high.
    - In this example I used InfluxDB (time-series DB) that receives the data from the script running on the edge device.
    - One instance per region/zone will be required, for faster/reliable communication with the edge nodes in the same region.

3. Data Visualization: "data_visualizer" component.

- A centralized visualization system is required to display metrics and create alerts (Grafana, Zabbix or Cloudwatch).
- I used Grafana, it is easy to set up and integrate with InfluxDB.

Enhancements (to be applied)

Security

- Replace the self-signed certificates in Grafana & InfluxDB with CA signed certificates.
- Encrypt all the passwords & tokens used in the scripts.

Backup

- Create backup jobs of the Grafana and InfluxDB configurations and store them on a separate storage system.

Operations

- Collect more detailed metrics: swap utilization, temperature, GPU utilization, network utilization,.... I was not able to run the GPU & sensor commands for some reason and needed some time to troubleshoot.
- The script should store the metrics in JSON format which is compatible with most monitoring systems.
- Set a data-retention policy for the logs and metrics and cleanup files/data.
- Updating the script to send older metrics, if file transfer failed for any reason.
- Both the Grafana and InfluxDB need to be monitored (CPU, memory, disk, network utilization,....) and scale if needed.