2023

Project Walkthrough

XR70CX TEMPERATURE READINGS TO AWS CLOUD

11-28-2023

Contents

Project Walkthrough

Overview:

The project focused on developing a pipeline system to get temperature data from Dixell XR70CX sensor and send it over to AWS cloud. The incoming data was connected to server using and RS485 to USB serial converter and NodeRED was used as the communication agent. The node package node-red-contrib-modbus was employed to implement a robust system.

Following is the view of the NodeRED flow developed for this project:

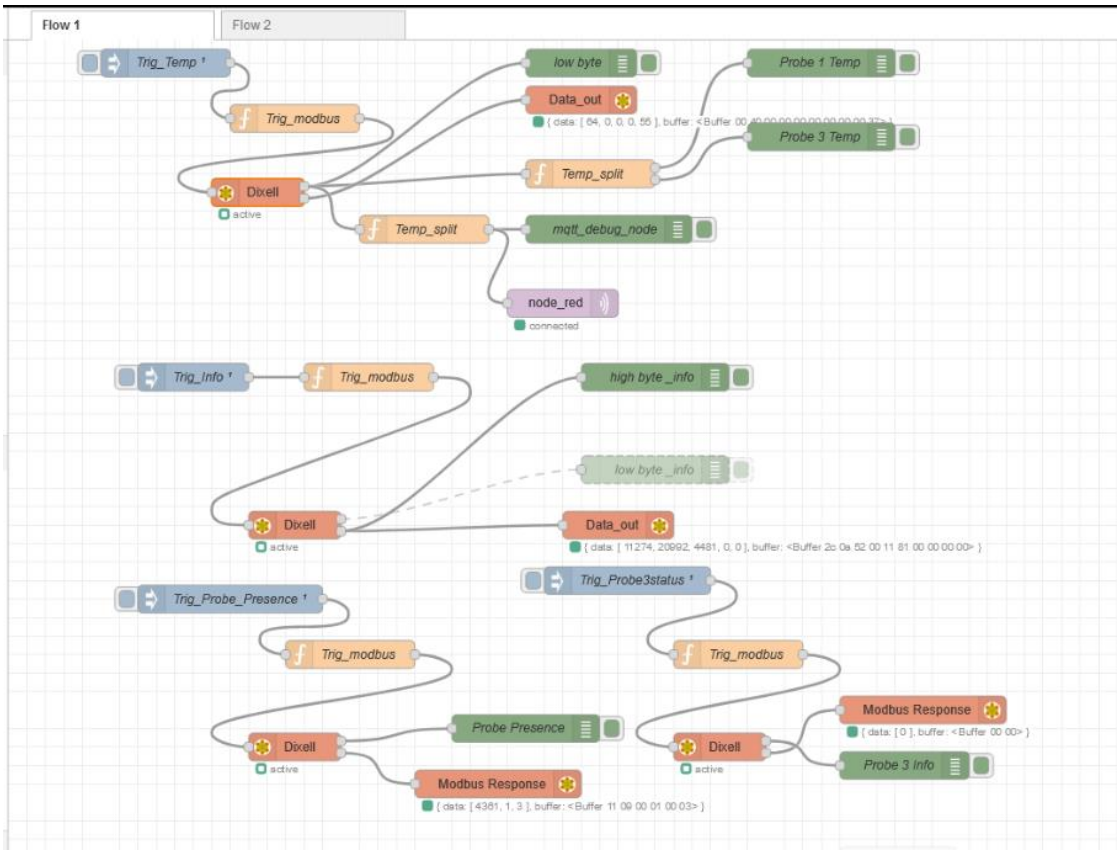

Figure 1 NodeRED flow diagram

Pipeline Structure:

The data flows structure is such as described below in steps :

XR70CX to Server computer

The data from sensor was connected to the computer using RS485 to USB serial converter and the device shows up as USB serial device occupying a COM port on the computer. The sensor itself utilizes MODBUS protocol to this provided a method to communicate MODBUS commands to sensor and read the current data.

The protocol has following parameters:

Baud Rate = 9600

Data Bits = 8

Parity Bit = None

Stop Bit = 1

COM Port = As assigned by the PC

These parameters were added to the MODBUS node settings in NodeRED to ensure proper communication between both.

Computer to NodeRED

NodeRED was installed locally on the host PC, and it was started from the command prompt using the "node-red" command and opening the local port http://127.0.0.1:1880/.
This starts the local NodeRED deployment. We added the amazon AWS packages as well as the node-red-contrib-modbus package to get the basic structure for communication.

The node communincation for MODBUS sensor was as follows.

Figure 2 MODBUS request node settings

Figure 4 Request node input

Figure 3 Resultant Output

NodeRED to AWS

Sending data from NodeRED to AWS cloud involved using the MQTT protocol by first filtering the incoming data upon MODBUS read, extracting the temperature values and sending it over the to AWS using MQTT.

The MQTT protocol was setup in AWS by creating and IoT core “Thing” and using it to manage MQTT data.

Inside the NodeRED the MQTT node was used, and necessary certificates were installed to configure secure TLS communication between AWS and NodeRED. After the setup, data was injected into MQTT as a payload and AWS was subscribed to the relevant MQTT topic where sensor values were being Published. The result was sensor data being sent over to cloud server AWS.

Following figures show the necessary configurations for NodeRED nodes for MQTT protocol.

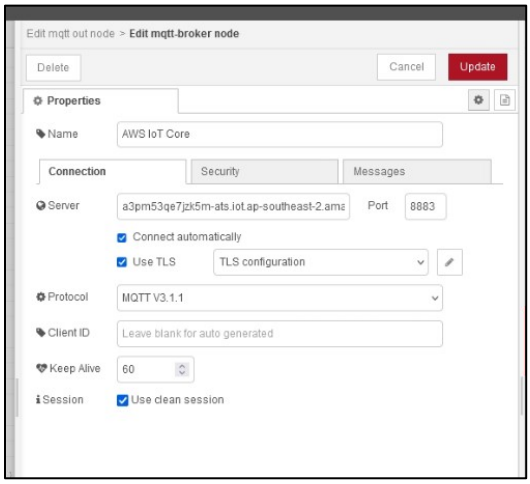

Figure 5 MQTT node configuration

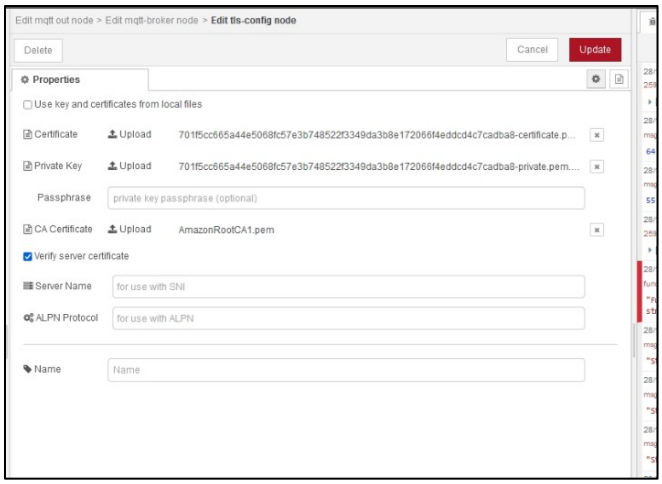

Figure 6 TLS setup for AWS

And the resultant data received at the AWS showed Probe 1 and Probe 3 Temperature values (as only those were connected).

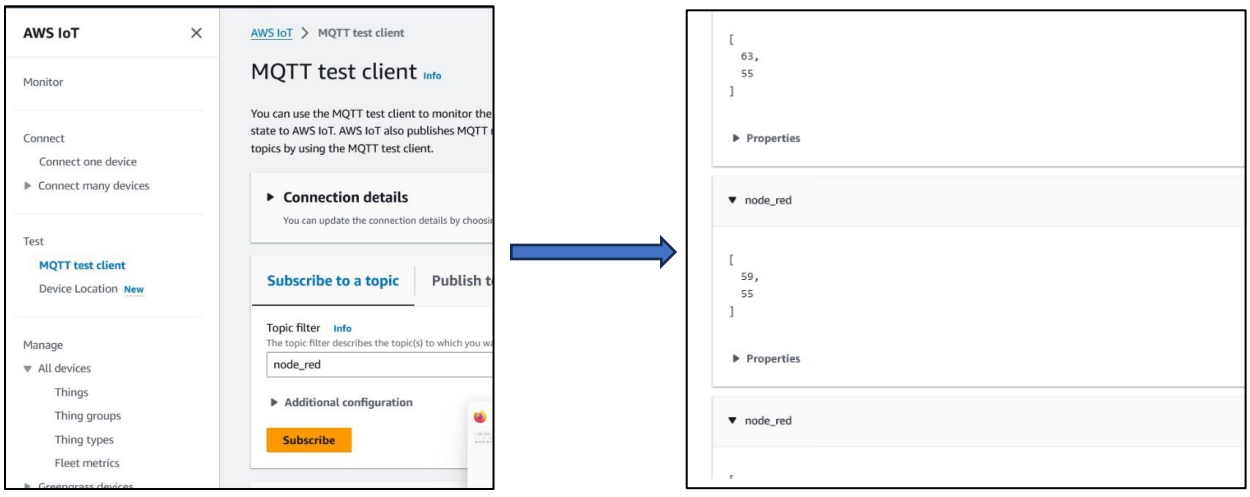

Figure 7 AWS cloud data logging