Team 3 Climate Control System: Activity Diagram
IOT model using MQTT broker for controller to actuator node communications

MQTT Topic Subscription
MQTT Topic Publishing

Zone User

Changes & view temperature in their specific climate controlled unit

Zone User application access

New Set temp
- No → View Current Temp
- Yes → Update DB set MA-Node temp

DB Connections Not shown

Controller

Collects current temperature & diaganostics of all climate controlled zones

Checks for new temperatures from zone user interface app

Publishes new temperatures to application database

Writes diagnostic data to log file

DB Connections Not shown

Start Continous Loop

DB query new MA-Node set temperature

Subscribe to current temp topic tree

New set-temp request?
- No → Enter Loop wait
- Yes → Retreive MA-Node encryption key → Encrypt message payload → Publish to set-temp/MA-Node topic

Callback recieved?
- No → MQTT Loop wait
- Yes → Identify MA-Node create query → Connect to database update current temp for MA-Node

MQTT Broker

Enables asynchronous communication between controller and monitoring/actuation nodes

MQTT Client Connection

Authenticated Client?
- No → Drop Message
- Yes → Write message to topic

Monitor/Actuator Node

Checks current temperature via digital sensor

Enables heating & cooling systems
Performs self diagnostics

Periodically report temp & diag data to controller

Power on MA-Node → Default Temp setting → Start continuos loop → Subscribe to set-temp-topic/ MA-Node → Check current zone temperature

Logic for determining range ommited for readability

Temp within set range
- Yes → Begin Wait loop, update loop counter
- No → Above or below range
  - Above → Initiate cooling
  - Below → Initiate heating

Begin Wait loop, update loop counter

Loop counter divisable by 3
- Yes → Publish Current Temperature

Loop counter divisable by 12
- No
- Yes → Publish Current Diagnositics

Complete Wait loop return to top

Phase