PHASE 4 -DEVELOPMENT PART 2

SERVERLESS IOT DATA PROCESSING

# CREATED BY : Kaviya.m

# Step 1: Setup IBM Cloud

1. Create an IBM Cloud account if you don't have one already.
2. Set up an IBM Cloud Functions (Serverless) environment.

# Step 2: Connect Smart Devices

1. Identify and connect your smart devices (e.g., thermostats, motion sensors, cameras) to your IoT platform. Each device should have a unique endpoint and authentication mechanism.

# Step 3: Data Collection

1. Use MQTT or other IoT protocols to collect data from your smart devices.
2. Write Cloud Functions that subscribe to the device data streams and process the incoming data in real-time.

# Step 4: Data Processing

1. Define Cloud Functions to process the data from each type of smart device.
2. Perform feature engineering, data cleansing, and aggregation as needed.
3. Implement routines for energy efficiency and home security. For example, adjust thermostat settings based on motion sensor data to save energy.

# Step 5: Real-time Automation

1. Create Cloud Functions that trigger actions based on specific events or data thresholds. For example, send an alert if an unauthorized motion is detected by your camera.

# Step 6: Data Storage and Analysis

1. Store the processed data in IBM Cloud Object Storage.
2. Use IBM Watson Studio or similar tools to analyze the stored data, gain insights, and generate reports on your smart home's performance and efficiency.

# Step 7: Evaluate and Refine

1. Continuously monitor the performance and efficiency of your smart home.
2. Make adjustments to your automation routines and data processing as needed.

# Step 8: Document Your Project

1. Create a Word document to detail the steps, code snippets, and configurations used in your project.

Here are some code snippets you might use as examples for your Word document:

pythonCopy code

# Example Cloud Function to process thermostat data def process\_thermostat\_data(data): # Data processing logic here # Adjust temperature settings for energy efficiency return processed\_data # Example Cloud Function to process motion sensor data def process\_motion\_sensor\_data(data): # Data processing logic here # Trigger security routines return processed\_data # Example Cloud Function to store data in IBM Cloud Object Storage def store\_data\_in\_object\_storage(data, object\_storage\_url): # Code to store data in IBM Cloud Object Storage return storage\_response

In your Word document, you can expand on these code snippets, provide detailed explanations, and include any necessary configurations. Additionally, you should reference the specific IBM Cloud services and IoT platforms you are using, as they may have their own APIs and SDKs for integration.

# Step 9: Code Implementation

Below are some code examples for key components of your project:

## 1. Data Collection:

* To collect data from IoT devices, you can use MQTT client libraries or SDKs. For instance, if you're using Python, you can use the paho-mqtt library:

pythonCopy code

import paho.mqtt.client as mqtt def on\_message(client, userdata, msg): # Handle incoming messages here print(f"Received message: {msg.payload}") client = mqtt.Client() client.on\_message = on\_message # Connect to the MQTT broker and subscribe to a topic client.connect("mqtt\_broker\_url", 1883) client.subscribe("iot\_device\_topic") # Keep the client running to receive messages client.loop\_forever()

## 2. Data Processing:

* Process data from different IoT devices, as shown in previous examples. Implement feature engineering, data transformation, and energy-saving routines.

## 3. Real-time Automation:

* Implement real-time automation by using conditional statements in your processing functions. For example, if motion is detected, turn on the lights:

pythonCopy code

def process\_motion\_sensor\_data(data): if data['motion\_detected']: # Trigger lights to turn on control\_lights('on') # Continue with data processing

## 4. Data Storage and Analysis:

* Use the IBM Cloud Object Storage SDK to store processed data:

pythonCopy code

import ibm\_boto3 def store\_data\_in\_object\_storage(data, object\_storage\_bucket, object\_name): resource = ibm\_boto3.resource('s3', endpoint\_url='your\_object\_storage\_url') bucket = resource.Bucket(object\_storage\_bucket) bucket.put\_object(Key=object\_name, Body=data)

## 5. Evaluation and Refinement:

* Continuously monitor your smart home's performance and make adjustments based on your analysis. For example, you might evaluate energy consumption and refine your thermostat control logic.

# Step 10: Deployment and Configuration

* Deploy your Cloud Functions using the IBM Cloud CLI or web console.
* Configure your Cloud Functions to trigger on incoming data from IoT devices.

# Step 11: Documentation

In your Word document, provide detailed explanations and code snippets for each of the above components. Include instructions on how to deploy your Cloud Functions and configure your IoT platform. Additionally, document any third-party libraries or SDKs you've used and provide links to relevant documentation.