CLOUD-BASED IOT PLATFORM FOR REAL-TIME DATA PROCESSING

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AGENDA

- ABSTRACT
- LITERATURE SURVEY
- PROPOSED METHODS
- RESULTS AND DISCUSSIONS
- CONCLUSION
- REFERENCES

ABSTRACT

- **Objective**: Efficient real-time data processing using a cloud-based IoT platform
- **Issue**: Challenges in managing and analyzing vast amounts of IoT data in real-time
- **Importance**: Real-time data processing is crucial for timely decision-making, operational efficiency, and gaining actionable insights.
- **Data Collection**: Aggregating data from various IoT devices, sensors, and network traffic in real-time.
- **Technology Stack**: Overview of programming languages, frameworks, and tools used (e.g. MQTT, Apache Kafka, MongoDB, Apache,AWS IoT, and Kubernetes).
- **Development Phases**: Design, implementation, testing, and deployment stages.
- **Conclusion:** Cloud-based IoT platforms for real-time data processing are essential for leveraging IoT data's full potential, ensuring scalability, flexibility, and enhanced decision-making capabilities.

LITERATURE SURVEY

S.No	TITLE	YEAR	OBJECTIVE	PROS	CONS
1	Introduction to IoT and Cloud Computing Integration	M. Guizani et al 2019	This paper provides an overview of IoT concepts, architecture, and integration with cloud computing. It emphasizes the benefits of cloud services in managing IoT data and enabling real-time analytics.	Comprehensive architecture covering cloud-based iot platform for real-time data processing	Dependency on cloud services may introduce latency.
2	Real-time Data Processing in IoT	M. Zorzi et al 2020	The survey discusses various data analytics techniques applicable to IoT data.	importance of real-time processing in providing the necessary computational resources.	Complexity in implementing models.
3	Scalability and Flexibility of Cloud-based IoT Platforms	G. Casale et al 2023	Scalable architecture for processing IoT data using cloud services like Amazon Kinesis and Elastic MapReduce.	Cloud-based solutions can handle large-scale data processing efficiently.	High computational requirements for deep learning models.

CODING

cloud.py - C:/Users/benic/OneDrive/Desktop/cloud.py (3.11.5)

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```
import json
import time
import ssl
import boto3
import requests
from datetime import datetime
from paho.mqtt import client as mqtt_client
import subprocess
import psutil
import getpass
import paramiko

# Configuration for AWS IoT, Lambda, and DynamoDB
aws_region = 'us-west-2'
iot_endpoint = 'your-aws-iot-endpoint'
iot_topic = 'iot/topic'
client_id = 'your-client-id'
ca_path = 'path/to/AmazonRootCA1.pem'
cert_path = 'path/to/certificate.pem.crt'
key_path = 'path/to/private.pem.key'
dynamodb_table = 'IoTData'

# Function to create AWS IoT Thing
def create_iot_thing():
    iot = boto3.client('iot', region_name=aws_region)
    thing_name = 'MyIoTThing'
    response = iot.create_thing(
        thingName=thing_name
    )
    print(f"IoT Thing created: {response['thingName']}")

# Function to create DynamoDB table
def create_dynamodb_table():
    dynamodb = boto3.client('dynamodb', region_name=aws_region)
    response = dynamodb.create_table(
        TableName=dynamodb_table,
        KeySchema=[
            {
                'AttributeName': 'deviceId',
                'KeyType': 'HASH'  # Partition key
            },
```

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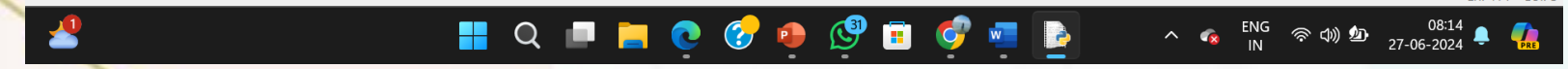
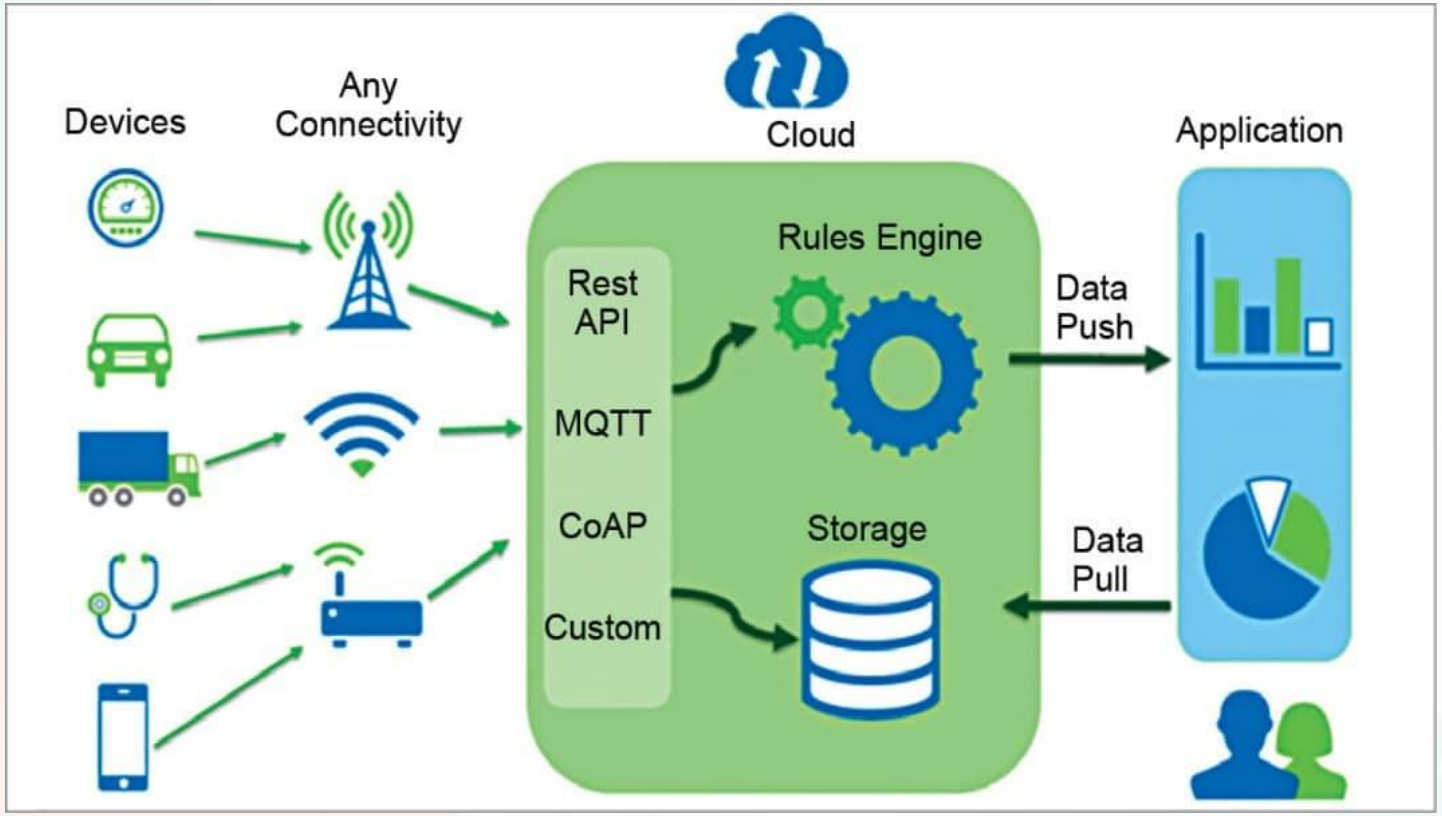
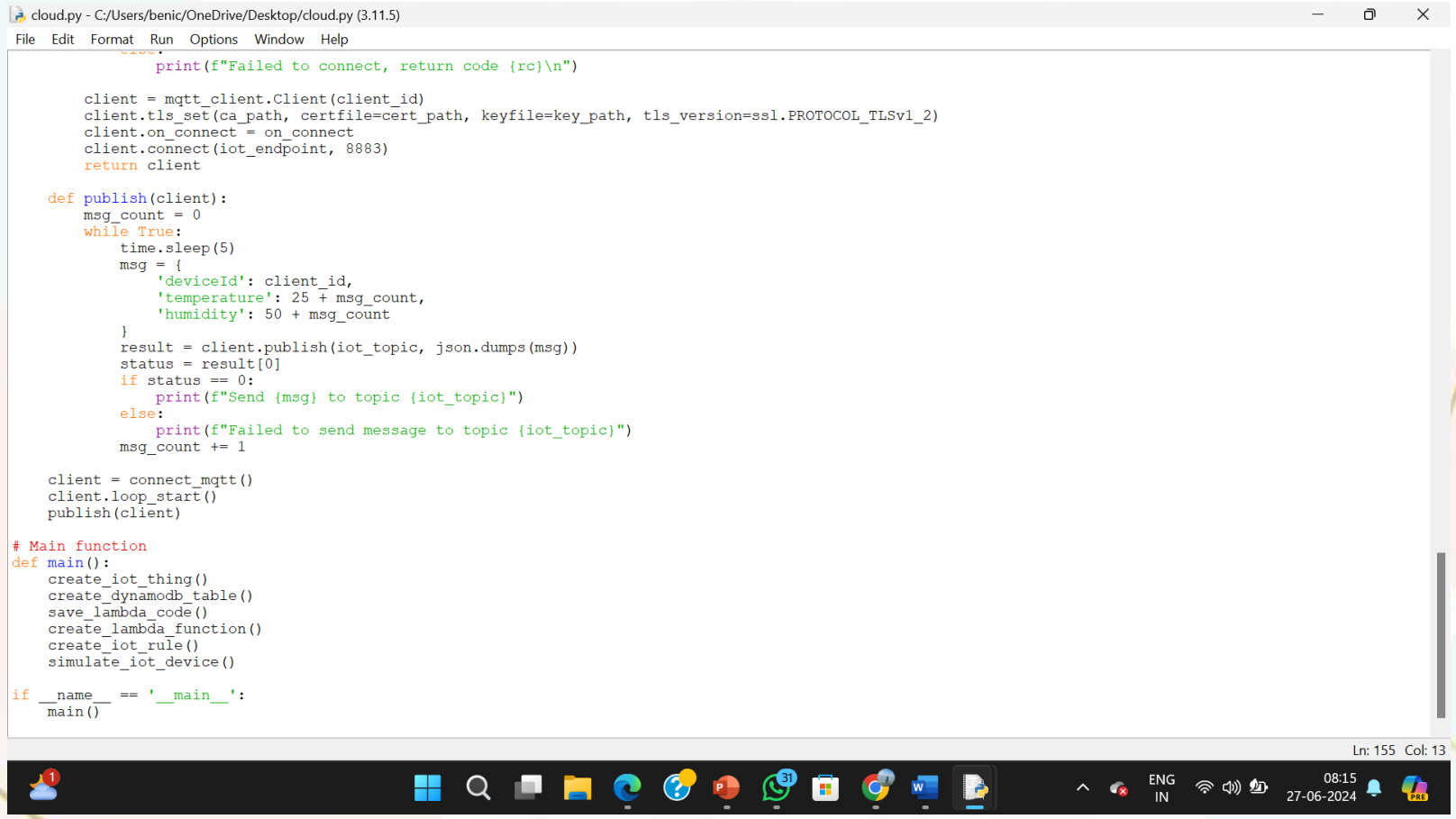


ARCHITECTURE DIAGRAM



OUTPUT


cloud.py - C:/Users/benic/OneDrive/Desktop/cloud.py (3.11.5)
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print(f"Failed to connect, return code {rc}\n")
client = mqtt_client.Client(client_id)
client.tls_set(ca_path, certfile=cert_path, keyfile=key_path, tls_version=ssl.PROTOCOL_TLSv1_2)
client.on_connect = on_connect
client.connect(iot_endpoint, 8883)
return client
def publish(client):
msg_count = 0
while True:
time.sleep(5)
msg = {
'deviceId': client_id,
'temperature': 25 + msg_count,
'humidity': 50 + msg_count
}
result = client.publish(iot_topic, json.dumps(msg))
status = result[0]
if status == 0:
print(f"Send {msg} to topic {iot_topic}")
else:
print(f"Failed to send message to topic {iot_topic}")
msg_count += 1
client = connect_mqtt()
client.loop_start()
publish(client)
# Main function
def main():
create_iot_thing()
create_dynamodb_table()
save_lambda_code()
create_lambda_function()
create_iot_rule()
simulate_iot_device()
if __name__ == '__main__':
main()
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CONCLUSION

- Cloud-based IoT platforms for real-time data processing provide exceptional capabilities for managing and analyzing vast data streams, enabling timely and informed decision-making.
- These platforms significantly enhance operational efficiency by automating data collection and analysis, allowing for immediate responsiveness and streamlined processes.
- Real-time monitoring and advanced analytics offered by these platforms enable proactive data management, improving overall system reliability and performance.
- The integration of cloud-based IoT platforms unlocks new opportunities for innovation and operational excellence, driving continuous improvements across various industries.

FUTURE SCOPE

- **AI and Machine Learning Integration**: Future cloud-based IoT platforms will increasingly incorporate advanced AI and machine learning algorithms to enhance predictive analytics, anomaly detection, and automation capabilities, driving smarter and more efficient operations.

- **Enhanced Security and Privacy**: Ongoing advancements in encryption, blockchain, and AI-driven security measures will strengthen data protection and ensure compliance with evolving regulatory standards, addressing concerns about data privacy and cybersecurity.

- **Industry-specific Customization**: There will be a rise in tailored IoT solutions designed to meet the unique needs of specific industries such as healthcare, agriculture, manufacturing, and smart cities, providing targeted benefits and improved operational efficiency.

- **Scalability and Flexibility**: Future cloud-based IoT platforms will offer even greater scalability and flexibility, allowing businesses to easily expand their infrastructure to accommodate growing data volumes and diverse device networks.