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Smart industry automation

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ABSTRACT

In this new era, everyday life is filled with technology from the startup till to bed. Internet of Things (IoT) is fast becoming a disruptive technology business opportunity, with standards emerging primarily for wireless communication between sensors, actuators, and gadgets in day-to-day human life, all, in general, is referred to as "Things". This offers the capability to measure for understanding environment indicators. This paper addresses how to accomplish factory/Industry environment and get the data out of it check the possibility of planned IoT use case and building up Proof Of Concept (POC) which will simulate factory/Industry environment to solve it.

Keywords— *IoT, POC, Industry 4.0*

1. INTRODUCTION

Today, Internet application development demand is very high. So IoT is a major technology by which we can produce various useful internet applications. The Industrial Internet of Things (IIoT) is the application of the Internet of Things (IoT) in an industrial setting which applies smart technology (smart sensors), data collection/storage, and cloud-based analytics connected together using the internet's infrastructure to achieve value-added performance within an industry's enterprise.

In this project, the data from sensors is sent to MQTT broker to a specific MQTT topic. From the topic, the data will be pushed to a Kafka topic. The data from the Kafka topic will be sent to Spark and finally, it will be sent to Hbase and Dashboard from Spark.

2. OBJECTIVE

Industry 4.0 is definitely a revolutionary approach to manufacturing techniques. Industry 4.0 is an upcoming thing that every industry is aiming at worldwide. That is getting the factory data online over the internet and get the factory data digitized which is not currently done. To accomplish this Industry 4.0 stakeholders of a factory and industry face problem in trying out the IIoT on live production environment which is a security breach, as well as disturbing the production process. For this reason, CTO and CIO's are interested in building up POC. To overcome this, project aims to bring up the factory model scenario which has plethora sensor installed, collect the sensor data on regular basis process the data queue present the collected data in web dashboard for instant and historical review from the factory.

3. METHODOLOGY

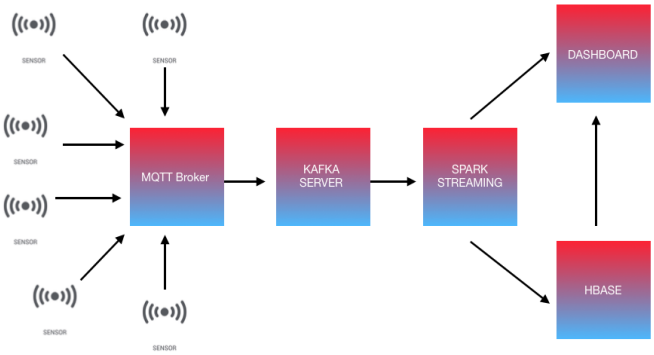

Fig. 1: Architecture

3.1 Architecture

- The sensor data is transmitted using message queueing protocol, Message Queueing Telemetry Transport (MQTT).
- Message Queueing Telemetry Transport. MQTT Client is any device from a microcontroller up to a full-fledged server that has an MQTT library running and is connecting to an MQTT broker over a network. MQTT Broker is primarily responsible for receiving all messages, filtering the messages, decide who is interested in it and sending the message to all subscribed clients under the brokers. Topics in MQTT broker to receive the data from publishers like MQTT Clients.
- Apache Kafka is an open source distributed streaming platform which is useful in building real-time data pipelines

and stream processing applications. Integrated Kafka for internal communication between the different streaming jobs.

- Kafka Cluster can receive the data from the MQTT broker. We receive the processed data from the MQTT broker to Kafka Cluster.
- Apache Spark is an open source and flexible in-memory cluster framework which serves as an alternative to map-reduce for handling batch, real-time analytics, and data processing workloads. It provides native bindings for the Java, Scala, Python, and R programming languages, and supports SQL, streaming data, machine learning, and graph processing.
- We have used Spark for improving the processing time and handle sparse data.
- Apache HBase is an Open source distributed column-oriented NoSQL database that runs on top of Hadoop Distributed File System (HDFS). It is natively integrated with the Hadoop ecosystem and is designed to provide quick random access to huge amounts of structured data. HBase in the final stage of the solution which is implemented for one of our clients to store the processed data.
- The processed data from the Kafka server is updated in the Kafka topic and it is consumed in the node socket server, updated to the frontend using WebSocket connection to project it in the live dashboard.

4. CONCLUSION

In this paper, the implementation of the POC for industry 4.0 is discussed. The concept will push global manufacturers to a new level of optimization and productivity. It can lead a non-industrial 4.0 company to an industrial 4.0 company.

5. FUTURE SCOPE

We have planned to implement industrial data from OPC-Servers to MQTT brokers and also accessing dashboard from remote places. Hence one doesn't need to be present at the factory to know the data.

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