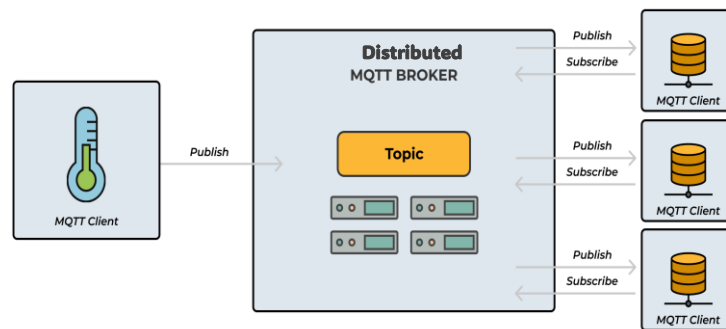**Distributed MQTT Broker Architectures for Robust and Scalable IoT Systems**

PROJECT INTRODUCTION

The emergence and proliferation of Internet of Things (IoT) technologies necessitate robust communication frameworks that can handle the increasing volume and velocity of data transmission between devices. The Message Queuing Telemetry Transport (MQTT) protocol is a lightweight messaging protocol widely adopted for small sensors and mobile devices optimized for high-latency or unreliable networks. Having a

centralized broker in MQTT can pose challenges such as potential bottlenecks, single points of failure, and limited scalability. Utilizing distributed MQTT broker architectures can significantly enhance the scalability and reliability of data communication within large-scale IoT systems. This assignment seeks to delve into the design, development, and evaluation of distributed MQTT broker architectures to address the challenges associated with scalable IoT communication frameworks.

STUDENT TASKS

The assignment tasks are aimed at exploring the distributed MQTT broker architectures and their implications on data communications. The tasks include, but are not limited to:

In-depth research and evaluation:

- Conduct a thorough research and evaluation of distributed MQTT broker architecture types.
- Develop and implement distributed MQTT broker architectures, analyzing the practical considerations and challenges associated with deployment in real-world scenarios.
- Analyze the performance characteristics of various distributed MQTT architectures, such as latency, throughput, and scalability.
- Explore how distributed data authentication and authorization is addressed.
- Document and present findings, conclusions, and recommendations based on the research, implementation, and testing outcomes, with a focus on the distributed MQTT broker architectures.

The student will be supervised by a researcher from the Ambient Intelligence research group.

PRACTICAL INFORMATION
Student profile: Interest in data networks and computing, networking technologies and protocols with IoT solutions and tools. A proactive attitude able to work independently. Passion for networking, Linux OS, C/C++, shell scripting and Python. Familiar/interested with any of the multi-protocols (e.g. MQQT, etc).
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