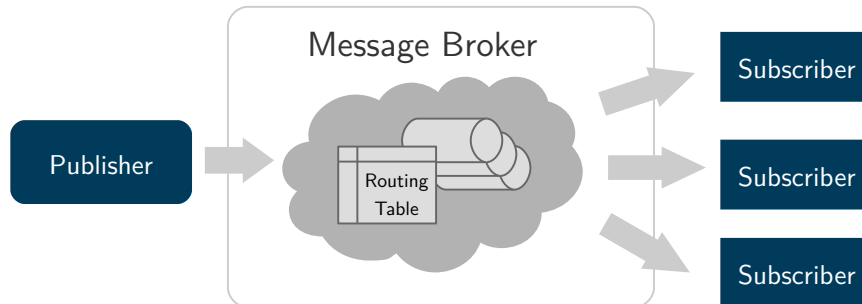


Efficient and Reliable Multicast in Publish–Subscribe Systems

184.194 Seminar in Distributed Systems (3.0 EC)



Motivation

Publish–Subscribe (pub/sub) is messaging pattern for facilitating communication in loosely coupled distributed systems. It has gained increasing popularity in the context of Internet of Things (IoT) applications. Specific implementations, such as Message Queue Telemetry Transport (MQTT) are praised for their scalability and performance attributes. However, efficient and reliable message dissemination in networks with a high number of subscribers is still a challenge. Most pub/sub systems (such as MQTT) are built on top of TCP which does not support transport-layer multicast. Consequently, these systems rely on application-layer multicast-over-unicast (i.e., point-to-point connections to each subscriber) to disseminate messages.

Efficient and reliable application-layer multicast for pub/sub systems has captivated researchers for many years. There exists a variety of approaches for both content-based as well as topic-based pub/sub message dissemination. Real-world message brokers, such as RabbitMQ or Mosquitto have implemented pragmatic strategies for efficient multicast.

The aim of this seminar paper is to survey existing application-layer multicast-over-unicast methods in pub/sub messaging systems. The focus should be pub/sub systems built on TCP, and different infrastructures and routing methods for multicast, such as broker overlays and gossiping protocols. The expected result is a survey of existing research as well as a comparison of state-of-the-art message brokers, and a discussion of limitations of these approaches.

Work Description

- A survey of research on multicast methods for pub/sub systems
- A comparison of multicast methods in state-of-the-art pub/sub message brokers
- Discussion of limitations of approaches in terms of reliability and scalability

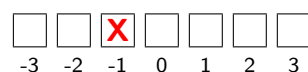
Further Information

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Conceptual (Analytical)



Empirical (Simulation)



Practical (Implementation)



Literature Work