Mobility Management in Publish/Subscribe Middleware

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ABSTRACT

In this research work, a survey on Mobility issues in Publish/Subscribe (P/S) Middleware and their applications was carried out. Publish/subscribe is appearing as a communication paradigm matching well with highly dynamic distributed applications characterized by reconfigurability, flexibility, and scalability. Nevertheless, very few efforts tackle dynamic modifications in the topology of the P/S distributed dispatching infrastructure despite such events represent a basic confrontation in mobile computing scenarios. In this paper, the authors clarify the mobility's issues in the context of publish-subscribe middleware and survey solutions and protocols suggested by several research groups.

Keywords: Ad Hoc Networking, Mobile Computing, Mobility, Mobility Management, Publish/Subscribe Middleware

INTRODUCTION

The design of publish-subscribe middleware, illustrated in Figure 1, is posed to several challenges due to mobility. The most obvious one is possibly that the system’s topology, commonly supposed static by existing systems, at present becomes dynamic and calls for toleration of the continual reconfigurations caused by the movement of mobile nodes. This may have different effect, depending on the scenario of mobility.

In many situations, mobility is delegated to the system’s periphery. Examples include nomadic scenarios when traveling, or commuting from home to office. In such cases, the user disconnects from one network and reconnects to a different one. Hence the node accesses the network from another point; nevertheless the user maintains the access to the network thanks to specific protocols (e.g., VPN). Analogous studies and protocols treat the modification of the network access point, such as Mobile IP (Perkins, 2002) by preserving the connectivity transparently at the network level. Hence, in both of these scenarios, only the users are mobile, thus, the infrastructure of the network is stable.

Analogous concepts can be implemented into the publish/subscribe architecture by considering the clients as the end nodes, while the brokers represent the routers of the system. Similar concepts are applied with the exhibition

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of logical mobility of code or agents (Fuggetta et al., 1998).

The rest of this paper is organized as follows. An overview of approaches treating the mobility of the client in publish/subscribe is provided. Then, the existing approaches for the mobility of the broker are described. Later, the link between the notion of location and mobility into publish/subscribe is presented and a discussion about the reconfiguration in publish/subscribe is offered. Finally, the last section emphasizes the importance of publish/subscribe systems in the mobile environment. The design of such systems requires mechanisms to support the mobility and it is yet an open issue.

MOBILE SUBSCRIBER

Supporting the mobility of clients represents the first and simplest form of mobility that should be handled by a publish subscribe middleware customized to mobile scenarios, by letting them to detach from the infrastructure and reattach from a different location after a time. This service is basic to hold those scenarios of mobility, for example nomadic computing, which support the disconnections. In these cases, the publish-subscribe middleware should be able to propose appropriate mechanisms making the transparency of mobility to the other components, facilitating the routing reconfiguration and stocking messages addressed to the mobile clients until their reconnection.

In this scenario of mobility, the publish/subscribe middleware must be able to buffer messages destined to the client during its disconnection period, and to change the brokers’ subscription tables when the reconnection of the client occurs. This demands a distributed protocol to coordinate the participating brokers and avoids the lost or duplication of messages sent during the running of the reconnection process.

The classification of approaches for supporting subscriber’s mobility in publish/subscribe networks can be based on the time and the manner that subscriptions and matching items are moved from an old to a new broker when a subscriber moves, thus three categories are found: reactive approaches (Caporuscio et al., 2003; Fiegeet al., 2003; Wang et al., 2007; Sourlas et al., 2010), durable subscriptions (Farooq et al., 2004), and proactive approaches (Burcea et al., 2004; Gaddah, & Kunz, 2009).
Elements of Utility Theory
www.igi-global.com/chapter/elements-utility-theory/74435?camid=4v1a