IDEA GROUP PUBLISHING

701 E. Chocolate Avenue, Suite 200, Hershey PA 17033-1240, USA ITB10624

Tel: 717/533-8845; Fax 717/533-8661; URL-http://www.idea-group.com

Chapter X

Object-Oriented Publish/Subscribe for Modeling and Processing Imperfect Information

Haifeng Liu, University of Toronto, Canada

Hans Arno Jacobsen, University of Toronto, Canada

Abstract

In the publish/subscribe paradigm, information providers disseminate publications to all consumers who expressed interest by registering subscriptions with the publish/subscribe system. This paradigm has found widespread applications, ranging from selective information dissemination to network management. In all existing publish/subscribe systems, neither subscriptions nor publications can capture uncertainty inherent to the information underlying the application domain. However, in many situations, knowledge of either specific subscriptions or publications is not available. To address this problem, this chapter proposes a new object-oriented

This chapter appears in the book, *Advances in Fuzzy Object-Oriented Databases: Modeling and Applications*, edited by Zongmin Ma. Copyright © 2005, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

publish/subscribe model based on possibility theory and fuzzy set theory to process imperfect information for expressing subscriptions, publications, or both combined. Furthermore, the approximate publish/subscribe matching problem based on fuzzy measures is defined, and the real-world A-ToPSS™ system is described.

Introduction

A new data-processing paradigm — publish/subscribe — is becoming increasingly popular for information dissemination applications. Publish/subscribe systems anonymously interconnect information providers with information consumers in a distributed environment. Information providers publish information in the form of publications, and information consumers subscribe their interests in the form of subscriptions. The publish/subscribe system performs the matching task and ensures the timely delivery of published events (a.k.a. notifications) to all interested subscribers. Publish/subscribe has been well studied, and many systems have been developed supporting this paradigm. Existing research prototypes include, among others, Gryphon (Aguilera, 1999), LeSubscribe (Fabret, 2001), and ToPSS (Liu, 2002); industrial strength systems include various implementations of JMS (Happner, 2002; Monson-Haefel, 2000), the CORBA® Notification Service (OMG, 2002), and TIB/RV. All of these systems are based on a crisp data model, which means that neither subscribers nor publishers can express imperfect information in subscriptions and publications, respectively. In this crisp model, subscriptions are evaluated to be true or false for a given publication. Moreover, most of these systems do not expose a well-structured subscription language model and publication data model.

However, in many situations, knowledge to specify subscriptions or publications is not available. In these cases, uncertainty about the state of the world has to be cast into the crisp data model that defines absolute limits. Moreover, for a user of the publish/subscribe system, it may be simpler to describe the state of the world with imperfect concepts — we say, in an approximate manner.

In a selective information dissemination context, for instance, users may want to submit subscriptions about an apartment with a constraint on rent that is "cheap." On the other hand, information providers may not have exact information for all items published. In a secondhand market, a seller may not know the exact age of a vase, so the seller can describe it as an "old" vase but cannot describe it with an exact age. Temperature and humidity information collected by sensors is

Copyright © 2005, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

30 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/object-oriented-publish-subscribe-modeling/4815

Related Content

Annotating Images by Mining Image Search
Xin-Jing Wang, Lei Zhang, Xirong Liand Wei-Ying Ma (2009). *Semantic Mining Technologies for Multimedia Databases (pp. 323-349).*
www.irma-international.org/chapter/annotating-images-mining-image-search/28840

Querying Graph Databases: An Overview
Sherif Sakrand Ghazi Al-Naymat (2011). *Advanced Database Query Systems: Techniques, Applications and Technologies (pp. 304-322).*
www.irma-international.org/chapter/querying-graph-databases/52307

Computation Offloading Method for Large-Scale Factory Access in Edge-Edge Collaboration Mode
Junfeng Man, Longqian Zhao, Bowen Xu, Cheng Peng, Junjie Jiangand Yi Liu (2023). *Journal of Database Management (pp. 1-29).*
www.irma-international.org/article/computation-offloading-method-for-large-scale-factory-access-in-edge-edge-collaboration-mode/318451

Discovering Quality Knowledge from Relational Databases
M. Mehdi Owrang O. (2009). *Database Technologies: Concepts, Methodologies, Tools, and Applications (pp. 238-256).*
www.irma-international.org/chapter/discovering-quality-knowledge-relational-databases/7915

INDUSTRY AND PRACTICE: Research Issues in Multimedia Databases
Hasan Pirkul (1996). *Journal of Database Management (pp. 35-36).*
www.irma-international.org/article/industry-practice-research-issues-multimedia/51171