

Chapter XXXIX

Push–Multicasting to Wireless Devices Using Publish/Subscribe Model

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ABSTRACT

Push technology is a kind of technology that automates the information delivery process without requiring users to request the information that they need. Wireless has experienced explosive growth in recent years; “push” will be the predominant wireless service delivery paradigm of the future. We can expect a large number and a wide variety of services, alerts and messages, such as promotional content, to be delivered to consumer’s phones or PDAs. To push information to wireless device becomes a challenge because of the problem of intermittent communication links and resource constraint on wireless devices as well as limited bandwidth. This chapter describes an efficient multicasting mechanism that “pushes” pre-specified information to groups of wireless devices. The mechanism is able to operate with limited bandwidth and also overcome the connectivity problem. A framework has been designed that implements the concept of push technology to multicast the sales information via wireless technology. The design of a message-oriented system for wireless information is described and that is followed by the implementation details that are compliance to Java Message Service (JMS).

INTRODUCTION

Today, the vast scale and scope of current online information sources on the Internet makes it difficult to find and process relevant informa-

tion. Finding a specific piece of information on the Internet requires time-consuming search. Hence, automation to push pre-specified information to the user seems like the next logical step to solve these problems.

We are moving towards third-generation wireless technology where multimedia applications are supported in wireless handheld devices and hand phones. It is believed that push will be the predominant delivery methodology in wireless device services. This is due to the problem of servers being unable to push data to clients who are disconnected. However this is not an issue in GPRS wireless networks. In GPRS wireless networks, the users will be always connected to the Internet. Hence, we can expect a large number and a variety of services, alerts, and messages, such as promotional content, to be delivered to consumers' mobile phones or PDAs in real time. In addition, there are some constraints in wireless technology, such as the small memory capacity in the devices, limited bandwidth, and the high cost of information searching on the wireless network. Push information to wireless handheld devices will save a great deal of time and money compared to surfing the Internet via WAP technology. Thus, this brings forth the idea, to create a "wireless push" channel to push information to wireless devices in real time.

Furthermore, from a software point of view, in order to cope with the limited bandwidth problem, this research will study an efficient multicasting mechanism to push sales information to a group of members over the wireless network. A simple application and framework about the Internet selling process has been designed, whereby the sales information like product catalog will be multicast to the interested mobile users in real time. The Publish/Subscribe messaging model has been used as a message delivery mechanism in this framework because of the capability of the messaging system to multicast information to a specific group of recipients. The following three criteria must be satisfied in order for a piece of information to be considered suitable for delivery using push mechanism:

- The kind of information desired must be known ahead of time like stock quotes, new headline, and so forth.
- Searching for such information must be an inefficient use of the user's time.
- The user must want this information regularly.

DATA DELIVERY MECHANISM

The paper "Data in Your Face: Push Technology in Perspective" (Franklin & Zdonik, 1998) presents some ideas on data dissemination in order to provide a framework for thinking about push technology. The authors have outlined several options for data delivery, and the comparison of their characteristics is illustrated below:

- **Client Pull vs. Server Push**—Pull based is a request-response operation, which is client-initiated transfer of information from server to client, whereas in push-based operation, the server initiates the transfer.
- **Aperiodic vs. Periodic**—Aperiodic is an event-driven operation, where the transfer of information is triggered by an event. In periodic delivery, the transfer information is performed according to a pre-arranged schedule.
- **Unicast vs. 1-to-N**—With unicast data communication, the data to be transferred is sent from one source to one destination, while multicast and broadcast are 1-to-N data communication. In multicast data delivery mechanism, the transfer data is sent to specific subsets of clients, whereas in broadcast data delivery mechanism, the transfer data is sent to an unidentified set of clients that can listen to it.

Periodic push has been used for data dissemination in many systems, for example an Internet mailing list that regularly sends out mail

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