

# **Dynamic Information Dissemination**

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University of Massachusetts Amherst A lthough the Web has evolved greatly since its inception, dissemination and delivery of rapidly changing information to large user communities remains a challenge. We all find ourselves in our daily lives relying on dynamic information, which ranges from real-time weather and traffic information to stock quotes to financial and news alerts. We're also finding ourselves increasingly interested not only in monitoring dynamic data but also in using it for making timely online decisions.

Consequently, we need techniques to disseminate such data as efficiently as possible. Existing techniques for static data replicate the data closest to the user, but this might involve large communication and computational costs for fast-changing data, which make such techniques infeasible for dynamic data. To this end, researchers have focused on new approaches to building efficient, resilient, and scalable content-distribution networks for dynamic data dissemination.

Caching-based approaches show promise, but there is much work to be done before we'll see information-dissemination systems that are satisfactory from both performance and correctness perspectives. Personalization mechanisms are also important; users are starting to demand that applications tailor information to the specific tasks or situations with which they're involved.

#### **A Brief Background**

Push-based data dissemination techniques include broadcast disks and publish-subscribe systems. In the broadcast disks abstraction, different data items are broadcast at different rates, depending on the frequency with which they're modified or accessed; any listener has access to this broadcast information. In the publish-subscribe model, however, publishers multicast information to specific listeners who are expected to subscribe to the information they need. Mechanisms that use multicast-based push, along with multicast tree construction algorithms, also aim to effectively handle dynamic data dissemination. Multicast involves sending updates only to those users who are explicitly interested in the information. A multicast tree is an overlay structure on a network that connects subscribers and publishers so that only the intended receivers get the information. Overlay networks are the subject of some of the work covered in this special issue's articles.

#### In this Issue

We're pleased to present three articles that represent a variety of issues involved with disseminating dynamic data via the Internet.

The first, "Publish–Subscribe Information Delivery with Substring Predicates," investigates the use of a peer-to-peer paradigm for dynamic data dissemination. In particular, the authors use distributed hash tables to match subscriptions with substring predicates to incoming events.

The second, "Architectural Alternatives for Information Filtering in Structured Overlays," takes an architectural view of information filtering in overlay networks, comparing two different architectures. Specifically, the authors compare the two alternatives along the dimensions of efficiency, scalability, and filtering effectiveness.

Finally, "A Taxonomy of QoS-Aware, Adaptive Event-Dissemination Middleware" presents an overview of adaptive event dissemination middleware, also known as event broker networks. The authors first review a broad taxonomy of the literature in the field and then turn to the specific issue of quality of service, which they examine along several dimensions. The article ends with a discussion of adaptive techniques for event delivery in such systems.

These three articles represent a broad range of ongoing research in the rapidly evolving field of dynamic information dissemination. Whereas these approaches use push-based dissemination, other mechanisms, such as adaptive pull or adaptive combinations of push and pull, could disseminate data through a repository overlay network. Alternative mechanisms such as these are worthy subjects for future research. We hope you enjoy reading this special issue as much as we enjoyed putting it together.

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