NORTHWESTERN UNIVERSITY

Computer Science Lecture Series

Controlled Update Propagation in Peer-to-Peer Networks

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Stanford University

12:30-1:30pm
Monday, April 7, 2003
Room 381 - Computer Science Dept.

Abstract:

In this talk we describe CUP, a protocol for performing Controlled Update Propagation to maintain caches of index entries in peer-to-peer networks. CUP controls and confines propagation to updates whose cost is likely to be recovered by subsequent queries. CUP allows peer nodes to use their own incentive-based policies to determine when to receive and when to propagate updates. We describe CUP and compare its performance against caching with expiration at intermediate nodes. We show that CUP significantly reduces average search query latency and that CUP update overhead is compensated for many times over by its savings in cache misses.

In the second part of the talk, we focus on how to fairly distribute the demand for particular content across the set of peer nodes that serve that content. Previous decentralized load balancing techniques in distributed systems base their decisions on periodic updates containing information about load or available capacity. We show that these techniques do not work well in the peer-to-peer context; either they do not handle peer node heterogeneity, or suffer from significant load oscillations which result in unutilized capacity. We propose a new decentralized algorithm, Max-Cap, based on the maximum inherent capacities of the replica nodes. We show that unlike previous algorithms, it is not tied to the timeliness or frequency of updates. Yet, Max-Cap can handle the heterogeneity of a peer-to-peer environment without suffering from load oscillations.

Biography:

Mema Roussopoulos is a Postdoctoral Fellow in the MosquitoNet Group at Stanford University. She received her PhD and Master's degrees in Computer Science from Stanford, and her Bachelor's degree in Computer Science from the University of Maryland at College Park. Her interests are in the areas of distributed systems, networking, and mobile and wireless computing.

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