Improving Concurrent Access in Collaborative Editing Systems

Ph.D. Dissertation Proposal

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Networked computer systems offer much to support collaborative editing of shared documents among users. Software Engineering is one of many fields that benefits from computer-assisted collaboration as a myriad of developers, project managers, testers, and designers work together to develop large, complex systems that consist of a multitude of process and product artifacts. Multi-discipline and geographically-distributed production and research teams collaborate and co-author documents for businesses and universities worldwide. Such collaborations occur asynchronously via access to shared document repositories often assisted by configuration management systems and occur synchronously via shared, real-time collaborative editing systems often assisted by awareness-enhancing technology.

Increasing concurrent access to shared documents by allowing multiple users to contribute to and/or track changes to these shared documents is the goal of collaborative editing systems; yet concurrent access is often limited in existing collaborative editing systems, and such systems are often specialized in their functionality and require users to adopt new, unfamiliar software to enable collaboration.

We propose a set of deadlock-free multi-granular dynamic locking algorithms and data structures that maximize concurrent access to shared documents while minimizing communication cost. These algorithms shows promise in providing a high level of service for concurrent access to the shared document while avoiding merge-based or operational transformation (OT)-based computational and communication costs. Our approach may incorporate "best practices" of collaborative editing systems research if desired.

Further, we propose an architecture that allows for a heterogeneous set of client editing software to connect with a heterogeneous set of server document repositories via Web services. This architecture supports our algorithms and does not require client or server technologies to be modified – thus it is able to accommodate existing, favored editing and repository tools.

Our preliminary work in developing a prototype benchmark system of our architecture that is responsive to users' actions and minimizes communication costs will also be presented. This prototype will be used to capture real-use-based computation and communication costs in future research.

Dissertation Committee

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