

Conflict Resolution with Roles in a Collaborative System

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Abstract- Computer-mediated collaboration is an increasingly prevalent means of connecting individuals and teams. Increasing research is being undertaken to improve virtual environments in order to enhance the ability of collaborators to interact effectively and cooperatively. However, computer-mediated collaboration differs radically from face-to-face human interaction with resultant problems for those relying on technology for collaborative purposes. Even though scientists are working hard to simplify collaboration by providing virtual tools and environments and collaborators work hard to be cooperative, there are still unknown problems for collaborators to find and overcome when using a collaborative system. Conflict resolution is one of the most important problems to overcome.

This paper briefly introduce an object model for collaborative systems (OMCS) and a multimedia co-authoring system (MCAS); discusses role management and conflict resolution in MCAS systems; emphasizes the usability of roles in conflict resolution. In the last section, it summarizes and concludes that role mechanisms can be very helpful in resolving conflicts in collaborative systems.

Index Terms— Conflict resolution, roles, collaborative systems

1. INTRODUCTION

Collaborative systems combine communication, computer, and decision support technologies to support problem formulation and solution in group meetings [19]. Team members are dependent on mediated interactions for coordination, and are likely to face important deficits in the information they have about the day-to-day activities of their teammates without them [20].

There are numerous differences between collaboration in a computer-supported environment versus a face-to-face environment. Even though scientists are working hard to simplify collaboration by producing systems that provide virtual environments, and collaborators work hard to be cooperative, there are still unknown problems for collaborators to find and overcome when using a collaborative system. In building a collaborative system, conflict resolution is one of the most important problems to overcome.

Early in 1988, scientists recognized this problem and began to study it [19]. Over the past decade, scientists have made numerous contributions. Poole et al. conducted research on how a non-specialized, multipurpose GDSS

influences conflict management in groups [19]. Edwards proposed a flexible conflict detection and management method [4]. Jung et al. suggested a conflict resolution method through coordination and argumentation agents [13]. Barber et al. discussed conflict detection in multi-agent systems [1]. Sun et al. proposed a formal specification of a unique combined effect for an arbitrary group of conflict and compatible operations [21]. Other scientists generalized their research by using algorithms in access control to solve this problem [3, 10].

However, even though role mechanisms have been applied very successfully in access control, i.e., Role-Based Access Control (RBAC) [9], there is little research on conflict management with roles [5, 8].

To support collaborative work, a workflow and access control mechanism is very useful [23, 30]. A role is a semantic construct forming the basis of access control policies [17]. Roles are powerful, policy neutral concepts used for facilitating distributed systems management and enforcing access control [14]. Roles provide a natural way for an enterprise administrator or security officer to describe the privileges of various job functions [16].

The other sections are organized as follows. In section 2, an object model for collaborative systems (OMCS) and a multimedia co-authoring system (MCAS) are introduced briefly and the conflict resolution structure with roles used in our system MCAS is described; in section 3, conflict resolution at the management level is discussed and the regulations for role management used in the interface design is demonstrated by Petri nets; in section 4, the conflict resolution at the document level is illustrated and the regulations of editing operations used in the design of a manager object are depicted; in section 5, some implementation issues for the method with roles in the MCAS system are outlined; and in the last section, the paper is concluded that a method with roles can help to resolve conflicts in collaborative systems and suggestions are provided on how to introduce roles into designing collaborative systems.

2. OMCS: AN OBJECT MODEL FOR COLLABORATIVE SYSTEMS

An Object Model for Collaborative Systems (OMCS) is designed and used as a guide to design a co-authoring system [24, 25, 26, and 27].

In terms of object-oriented technology [22 and 29], a collaborative system is addressed as an instance of the class $OMCS ::= \langle CSID, CSDS, CSOP \rangle$, where

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