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Chapter XIII

Trustworthy Data Sharing in Collaborative Pervasive Computing Environments

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Abstract

Collaborative Pervasive Computing Applications (COPCAs) can greatly improve the investigative capabilities and productivity of scientists and engineers. Users of COPCAs usually form groups to collaboratively perform their tasks using various computing devices, including desktop computers, pocket PCs, and/or smart phones, over Mobile Ad hoc Networks (MANET), LAN, and the Internet. These users usually share various types of data, including research ideas (documents), experimental and statistical data (numerical data, graphics, stream audio/video). A very important issue for sharing data in Collaborative Pervasive Computing Environments (COPCEs) is trustworthiness. To support trustworthy data sharing among groups of users of COPCAs, secure group communication, trustworthy

shared data discovery, flexible access control mechanisms, effective data replication, data quality assurance mechanisms, *and* intrusion detection mechanisms *are needed. In this chapter, the challenges, current state-of-the-art, and future research directions for trustworthy data sharing in COPCEs are presented. In particular, discussions will be focused on research issues and future research directions for* trustworthy shared data discovery *and* flexible access control *in service-based COPCAs.*

Introduction

Collaborative Pervasive Computing Applications (COPCAs), such as collaborative research and development environments, can greatly improve the investigative capabilities and productivity of scientists and engineers in many fields. Users of COPCAs usually form groups (or teams) to collaboratively perform their tasks. The collaborations are supported by the users' computing devices, such as desktop computers, pocket PCs, and/or smart phones, over various networks like Mobile Ad hoc Network (MANET), LAN, and the Internet. Users of COPCAs usually need to share various types of data, including research ideas (documents), experimental and statistical data (numerical data, graphics, stream audio/video). Data sharing among various groups of computing devices is one of the most important requirements for COPCAs because data sharing is required for efficient and effective group collaboration. For example, the status of each group member often needs to be shared for group collaboration, and all group members often need to share the same view of certain data when they collaborate on certain tasks.

During the past several years, research on mobile and pervasive data management has generated many useful results for managing and sharing data in pervasive computing environments. A significant trend in designing large-scale information systems in heterogeneous pervasive computing environments, consisting of multiple organizations, is utilizing Web services and emerging Semantic Web technology to improve interoperability and greatly enhance automated data composition/integration. However, most research focuses on how to improve the efficiency of discovering, accessing, distributing, and/or updating shared data. A critical issue, which has not attracted much attention, is trustworthiness of data sharing in COPCEs.