ABSTRACT

XML documents usually contain private information that cannot be shared by every user community. It is widely used in web environment. XML database is becoming increasingly important since it consists of XML documents. Several applications for supporting selective access to data are available over the web. Usage control has been considered as the next generation access control model with distinguishing properties of decision continuity. It has been proven efficient to improve security administration with flexible authorization management. Object-oriented database systems represent complex data structure and XML databases may be stored in the objects-oriented database system. Therefore authorization models for XML databases could be used the same as object-oriented databases. In this paper, we propose usage control models to access XML databases and compare with an authorization model designed for object-oriented databases. We have analysed the characteristics of various access authorizations and presented detailed models for different kinds of authorizations. Finally, comparisons with related works are analysed.

Keywords: Authorization; Usage Access; XML, XML Databases; XML Schema

INTRODUCTION

The extensible markup language (XML) is a standard for describing the structure of information and content on the Internet over the past several years. XML has recently emerged as the most relevant standardization in the area of document representation through markup language (Bertion, 2002). XML is used to store and exchange data in the Internet environment that may include private messages of customers. It overcomes the complexity of Standard Generalized Markup Language (SGML) and the user can define document structures, removing the limit of the fixed tags in Hypertext Markup Language (HTML). XML documents support storage of information at different degrees of sensitivity and varying granularity levels.

We identified two levels of authorization, instance level and the Document Type Definition (DTD) level are with which authorizations on XML documents can be defined (Bertion, Castano, Ferrari & Mesiti, 1999; Damiani, Capitani & Samarati, 2002). A DTD is a file which contains a formal definition of a particular type of XML documents. A DTD consists of the element declarations and the attributes declarations. Instance level authorizations denote
privileges that are relevant only to a specific
document. DTD level authorizations specify the
privileges of all documents following a given
DTD. XML Schema is an XML-based alterna-
tive to DTD (Kudo & Hada, 2000). It supports
complex constraints for XML components, such
as elements, attributes, datatypes and groups. A
well-validated XML document must follow the
format specified by one or more schemas. In
the access control model the central authority
uses XML schemas to specify the format of
information to be changed. With the features of
XML Schema, a flexible and easy-customized
access control model can be achieved.

Access control has been considered as a
major issue in information security community
since the beginning of the information
security discipline (Park & Sandhu, 2002).
Through access control, the system can restrict
unauthorized access to the resources in the
system and guarantees the confidentiality and
integrity of the resources. Manage access control
for database or other collections of structured
data, the traditional access control models, the
discretionary and mandatory access control
(Damiani, Paraboschi & Samarati, 2002;
Damiani, Samarati, Vimercati & Paraboschi,
2001; Kudo & Hada, 2000) have been
augmented by various research groups. Usage
control is a new access control model which
extends traditional access control models and
other access control models in many aspects.
The term “usage” means usage of rights on
digital objects. The main difference between
usage control and traditional access control
models are the continuity of access decision and
the mutability of subject attributes and object
attributes (Sandhu & Park, 2003).

A recent development in the database field
has been the introduction of semi-structured
and self-describing data, collection of the
data in XML format called XML Databases
(Wang & Osborn, 2004). Some work (Roshan
& Ravi, 1993; Wang & Osborn, 2004) on the
relationship between securing XML documents
and object oriented databases (OODB) has been
done. However, we have not found a detailed
discussion of how the usage access model can
be applied to XML databases. In this article,
we propose authorization models which adopt
usage control to manage access XML based
databases. Traditional access control, such
as the discretionary and mandatory access
control, focused on the control of access to
server-side objects. They use an algorithm to
compute a view of the target XML document
based on the user’s requirement rights. They
make authorization decisions on a subject’s
access request to target resources before access.
However, in usage access control, authorization
decisions are not only made before access, but
are also repeatedly checked during the access
period. Meanwhile obligations and conditions
become decision factors for the authorization
management of XML documents.

The remainder of this article is organized
as follows: Section 2 illustrates the background
of XML and XML databases. The usage control
model and continuity properties are also
introduced in this section. Section 3 is a review
of the OODB authorization model. In section 4
we proposed our authorization models for usage
control of XML databases. The models include
pre-Authorizations, ongoing-Authorizations,
pre-Obligations, ongoing-Obligations, pre-
Conditions and ongoing-Conditions. The
differences between this works in this article
from others are discussed in section 5. Finally,
Section 6 concludes the article.

BACKGROUND

XML

XML (Bray, Paoli, Sperberg & Maler, 2000) is a
markup language for describing semi-structured
information. Semi-structured data is just data
that does not fit neatly into the relational model.
In XML, data can have an elaborate and intricate
structure that is significantly richer and more
complex than a table of rows and columns.
XML makes possible capturing and expressing
data structure as we understand it, without
forcing it into an oversimplified structure. XML
documents can be classified into two categories:
M-Government and Its Application on Public Service Delivery
www.igi-global.com/chapter/m-government-and-its-application-on-public-service-delivery/210936?camid=4v1a

Incorporating the Negotiation Process in Urban Planning DSS
www.igi-global.com/article/incorporating-the-negotiation-process-in-urban-planning-dss/149185?camid=4v1a