XML DOCUMENTS AND ACCESS CONTROL MANAGEMENT

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Statement

I hereby declare that the work presented in this dissertation is my own and is, to the best of my knowledge and belief, original except as acknowledged in the text. It has not previously been submitted either in whole or in part for a degree at this or any other university.

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Acknowledgement

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Abstract

Security requirements of confidentiality, integrity and availability are essential for business online. With the growing acceptance of Extensible Markup Language (XML) technologies for documents and protocols, it is necessary that security should be integrated with XML solutions. XML was designed to transport and store data, especially over the Internet. Information exchanges on the Internet should meet precise protection requirements: fine-grained authenticity, secrecy, non-repudiation and access control. The requirements have to address for XML documents and XML applications [15]. XML has become an important universal language for the Internet-based business world [24]. An XML document can be generated from various resources with varying security requirements, such as Authentication, Authorization, Integrity, Signature, Confidentiality, Privacy and Digital Rights Management. According to these requirements, the main relevant developments of XML Security standards are [12, 15, 37]:

- XML Digital Signature,
- XML Encryption,
- XML Key Management,
- Security Assertion Markup Language (SAML),
- XML Access Control Markup Language (XACL).
XML is a fundamental component in many XML web services and it is used to store and exchange data in the Internet environment that may include private messages. 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) [26]. XML Security therefore must be integrated with XML in such a way as to maintain the advantages and capabilities of XML while adding necessary security capabilities.

Traditional access control models for XML primarily consider static authorization decisions based on the subjects’ permissions on target objects [91]. The models have been used only on the control of access to server-side objects and static authorization decisions are not assessed once an access permission is granted. Static authorizations for XML documents are performed without ongoing evaluating of query expressions against an actual database application. For example, a prepaid mobile needs ongoing checking to determine whether or not a call can continue or will be denied. To cope with these problems, recently proposed usage access control is a new access control model, which extended traditional access control models in multiple aspects: dynamic authentication, pre-authorization, ongoing-authorization, obligation and conditions [27].

In this dissertation, we aim to provide a bridge between the existing security technologies and the secure methods for XML documents. We extend existing web security technologies for XML documents. Usage access control models are analysed for XML schema and Document Type Definition (DTD) level authorizations. As validation of XML documents, technologies for XML databases have been enhanced and improved through usage access management. The theory developed in this dissertation can be applied in electronic services, such as E-learning. Role-based access
control (RBAC) is an access approach and permission-role assignments are main parts in RBAC. The new authorization algorithms for permission-role assignments in RBAC have been developed.
Publications Based on this Thesis


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