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**ITB11697**

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This chapter appears in the book, *Web and Information Security*  
edited by Elena Ferrari and Bhavani Thuraisingham © 2006, Idea Group Inc.

## **Chapter I**

# **Creating a Policy-Aware Web: Discretionary, Rule-Based Access for the World Wide Web**

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## **Abstract**

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*In this chapter, we describe the motivations for, and development of, a rule-based policy management system that can be deployed in the open and distributed milieu of the World Wide Web. We discuss the necessary features of such a system in creating a “Policy Aware” infrastructure for the Web and argue for the necessity of such infrastructure. We then show how the integration of a Semantic Web rules language (N3) with a theorem prover designed for the Web (Cwm) makes it possible to use the Hypertext Transport Protocol (HTTP) to provide a scalable mechanism*

*for the exchange of rules and, eventually, proofs for access control on the Web. We also discuss which aspects of the Policy Aware Web are enabled by the current mechanism and describe future research needed to make the widespread deployment of rules and proofs on the Web a reality.*

## Introduction

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Inflexible and simplistic security and access control for the decentralized environment of the World Wide Web have hampered the full development of the Web as a social information space because, in general, the lack of sufficiently sophisticated information controls leads to unwillingness to share information. This problem is greatly exacerbated when information must be shared between parties that do not have pre-existing information-sharing policies and where the “granularity” of the information to be shared is coarse—that is, where access is granted to an entire Web site or data resource because policy control mechanisms for access at a finer-grained level are not available. Even large intranets and controlled-access Webs face these problems as the amount of information and the number of information seekers grow. Thus, despite ever-greater amounts of useful information residing on the Web in a machine-retrieval form, reluctance to share that information remains and is likely to increase.

In this chapter, we will argue that a new generation of *Policy-Aware* Web technology can hold the key for providing open, distributed, and scalable information access on the World Wide Web. Our approach provides for the publication of declarative access policies in a way that allows significant transparency for sharing among partners without requiring pre-agreement. In addition, greater control over information release can be placed in the hands of the information owner, allowing discretionary (rather than mandatory) access control to flourish.

The technical foundation of our work focuses on developing and deploying the upper layers of the “Semantic Web layer-cake” (Figure 1, based on Berners-Lee, 2000; Swartz & Hendler, 2001) in order to enable Policy-Aware infrastructure. The ambition of the Semantic Web is to enable people to have richer interactions with information online through structured, machine-assisted integration of data from all around the Web (Berners-Lee, Hendler, & Lassila, 2001). We will show that it is possible to deploy rules in a distributed and open

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