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An ABAC framework utilizing XACML for IoT applications

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abstract

IoT (Internet of Things) and Big Data are technologies are commonly interconnected as one is usually dependent on the other in one way or another. Developments in sensor and microcontroller technologies are one or the pushing factors that are responsible for showing the potential significance of the implementations therefore giving them significance. Implementation scenarios wary from smaller scale to larger scale and the more significant ones are Smart City applications that commonly include many sub-systems like smart traffic control, energy and utility consumption and production monitoring, smart building management etc. Others include smart houses, health personal health monitoring, etc. As these application more often than not use confidential and/or personal information, a security component is needed to protect from unwanted intrusion, stealing or misuse. OASIS (Organization for the Advancement of Structured Information Standards) developed the XACML (eXtensible Access Control Markup Language) standard for writing/defining requests and policies in either a XML or JSON format and the evaluating of the requests over sets of policies for the purpose of enforcing access control over resources. It is defined so the requests and policies are readable by humans but also have a well defined structure allowing for precise evaluation. It utilizes ABAC (Attribute Based Access Control) which compared to RBAC (Role Based Access Control) systems is more difficult to implement but offers greater flexibility, lower maintenance requirements because of the adaptive nature of ABAC, and because of that, an overall more secure system. This work aims to create a security framework that utilizes ABAC and the XACML standard so that it can be utilized in other systems and enforce access control over resources that need to be protected by allowing access only to authorised subjects. It will also allow for fine grained defining and evaluation for more precise and therefore providing a greater level of security. This solution will also require NoSQL databases for storing policies and storing sensor data as the primary scenario considered is the integration in a Smart City application.

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