

SHIFT - Secure Heterogeneous InFormation Transfer for Relational Databases

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ABSTRACT

Data exchange between organizations is becoming a pervasive problem in the computer security landscape, particularly in the context of health information systems. With the timely access to accurate data, health practitioners are able to make informed decisions about patient treatments. Such data access is particularly important in the cardiovascular domain, which, according to the World Health Organization (WHO), is the primary cause of individual fatalities in developed countries. Access to a patient's medical history is critically important in order to successfully diagnose a wide array of cardiovascular problems (CITE #3/4 from paper).

Standard solutions for secure information exchange, such as the Electronics Data Interchange (EDI), have been deployed in clinical settings for several years. However, with the emergence of modern web applications and services, the adoption of solutions based on eXtensible Markup Language (XML) technologies have risen in popularity. With eXtensible Stylesheet Language Transformations (XSLTs), XML documents containing vital data from a separate organization can be molded to match a different, yet compatible, schema. The interoperability properties of XML have thus given rise to data interchange frameworks based on XML solutions in recent years [1].

JavaScript Object Notation, or JSON, is another increasingly popular data interchange format. While it is similar in XML in many regards, its syntactic simplicity makes it a very appealing alternative to XML for data exchange (TODO: cite JSON). Since JSON is not a document markup language, it does not have the same extensibility of XML. However, its flat structure enables much easier and more efficient parsing of data, and thus makes it an appealing candidate for addressing the problem of secure data exchange.

SHIFT, a Secure Heterogeneous Information Transfer mechanism for relational databases, is inspired by the mediator design pattern for centralizing and managing pairwise interactions between many subjects using a publish-subscribe enrollment approach. Subjects will register with the SHIFT

service by providing their own database schema and other pertinent identification information. This will enable SHIFT to push and pull data from subject databases using their provided schema. Once registered, subjects can push data to other known subjects by transferring data to the SHIFT service. Similarly, subjects can query for data from other known subjects by requesting data from the SHIFT service.

This framework builds upon the model presented in [1] with two very important enhancements. Firstly, JSON, rather than XML, is used as the data interchange format between relational databases. Mappings between database schemas, as well as the schemas themselves, can easily be represented using JSON. Secondly, the notion of data confidentiality while transmissions are being made is not discussed in [1]. Therefore, we plan on extending the framework to include PKI system for encryption. A CA is used to sign all certificates.

TODO: need two more paragraphs.

1. REFERENCES

- [1] H. Jumaa, P. Rubel, and J. Fayn. An xml-based framework for automating data exchange in healthcare. In *e-Health Networking Applications and Services (Healthcom)*, 2010 12th IEEE International Conference on, pages 264–269, july 2010.