SemPIF: A Semantic Meta-Policy Interchange Format for Multiple Web Policies

Prof.(Dr.) Yuh-Jong Hu¹  Dr. Harold Boley²

¹Emerging Network Technology(ENT) Lab.
Department of Computer Science
National Chengchi University, Taipei, Taiwan

²Semantic Web Lab
NRC-CNRC, Canada

2010 IEEE/WIC/ACM International Conference
Outlines

- Introduction
- Semantic Web Layered Architecture
- A Scenario of Digital Library Subscription
- SemPIF for Multiple Web Policies
Part I

Introduction
Research Statements for SemPIF

- A semantics-enabled layered policy architecture for the exchange and management of multiple policies created by different policy languages on the Web.
- SemPIF is nicely fitted into the semantic web layer cake architecture:
  - Unifying Logic Layer (UNL)
  - Policy Interchange Format (PIF) and Meta-PIF
  - Privacy Protection/DRM (PPD)
  - Domain Specific Applications (DSA)
Policies are formulated and treated as knowledge bases, i.e., ontologies and rules.

A meta-policy is a policy about policies that provides a set of rules for realizing services needed for the management of policies.
Part II

Semantic Web Layered Architecture
SemPIF Layered Policy Architecture

User Interface

Domain Specific Applications

DRM
Privacy Protection

Trust

Policy Interchange Format (PIF):
- XML-level: XACML, WS-Policy
- Horn-based: EPAL, Protune
- DL-based: KAoS, Rei
- REL: P3P, ODRL, XrML

meta-PIF

Proof

Unifying Logic

- Query: SPARQL
- Ontology: OWL, RDFS
- Rule: RIF

Data Interchange:
- RDF
- XML
- URI/IRI
A Facilitator for Enforcing PIF and Meta-PIF

SemPIF Framework

- PIF
- Ontologies + Rules
- Ontologies + Rules

Facilitator

- policy modifying, deleting, reconciling, etc.
- policy uploading
- policy uploading
- policy uploading

Client

- Ontologies + Rules
- Semantic PP Policies
- P3P

NCCU library portal

- Semantic DRM/PP Policies
- ODRL
- XACML

Digital library portal

- Semantic DRM/PP Policies
- Ontologies + Rules
Part III

A Scenario of Digital Library Subscription
A Scenario of Digital Library Subscription

**Server Side:**
The NCCU university library has subscribed to IEEE, ACM, and Springer digital library services, which provide a set of eJournal article access rights for authorized students and staff. There are two types of policy for an IEEE Web server: one for DRM and the other for the declaration of privacy statements.

**Client Side:**
A student, John, as a Web client has privacy protection policies, i.e., policy(pp3 − John), policy(pp4 − John) to address how and what of his personal data can (or cannot) be collected, retained, or disclosed from a Web server.
A PIF-based Ontology for DRM Policies

Y. J. Hu and H. Boley (NCCU& NRC)
A PIF-based Rule in the IEEE Web Server: policy(drm1 − IEEE)

\[\text{?st}\#\text{Student}\land\text{?id}\#\text{StudentID}\land\text{?st[own}}\rightarrow\text{?id}]\
\land\text{?uni[nccuHasPartR}}\rightarrow\text{?rg]}\land\text{?st[enrolledAt}}\rightarrow\text{?uni}]\
\land\text{?rg[issue}}\rightarrow\text{?id]}\land\text{?uni[nccuHasPartN}}\rightarrow\text{?lib}]\
\land\text{?lib[subscribedTo}}\rightarrow\text{IEEE]}\land\text{IEEE[hasPublished}}\rightarrow\text{?ejr}]\
\land\text{IEEE[endowedWith}}\rightarrow\text{?rgt]}\land\text{?rgt[appliedTo}}\rightarrow\text{?ejr}]\land\text{IEEE[delegate}}\rightarrow\text{?st}]\
\implies\text{?st[endowedWith}}\rightarrow\text{?d]}\land\text{?st[endowedWith}}\rightarrow\text{?v]}\
\land\text{?st[endowedWith}}\rightarrow\text{?p]}\land\text{?d#Download}}\land\text{?d[appliedTo}}\rightarrow\text{?ejr}]\
\land\text{?v#View}}\land\text{?v[appliedTo}}\rightarrow\text{?ejr}]\land\text{?p#Print}}\land\text{?p[appliedTo}}\rightarrow\text{?ejr}].
A PIF-based Ontology for Privacy Protection Policies
A PIF-based Rule in the IEEE Web Server: policy(pp1 ¬ IEEE)

Part IV

SemPIF for Multiple Web Policies