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

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Outlines

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


Part I

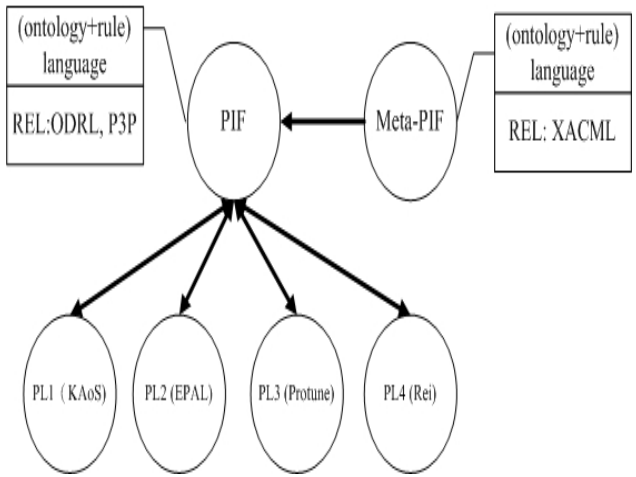
Introduction

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)


Policy Integration and Management

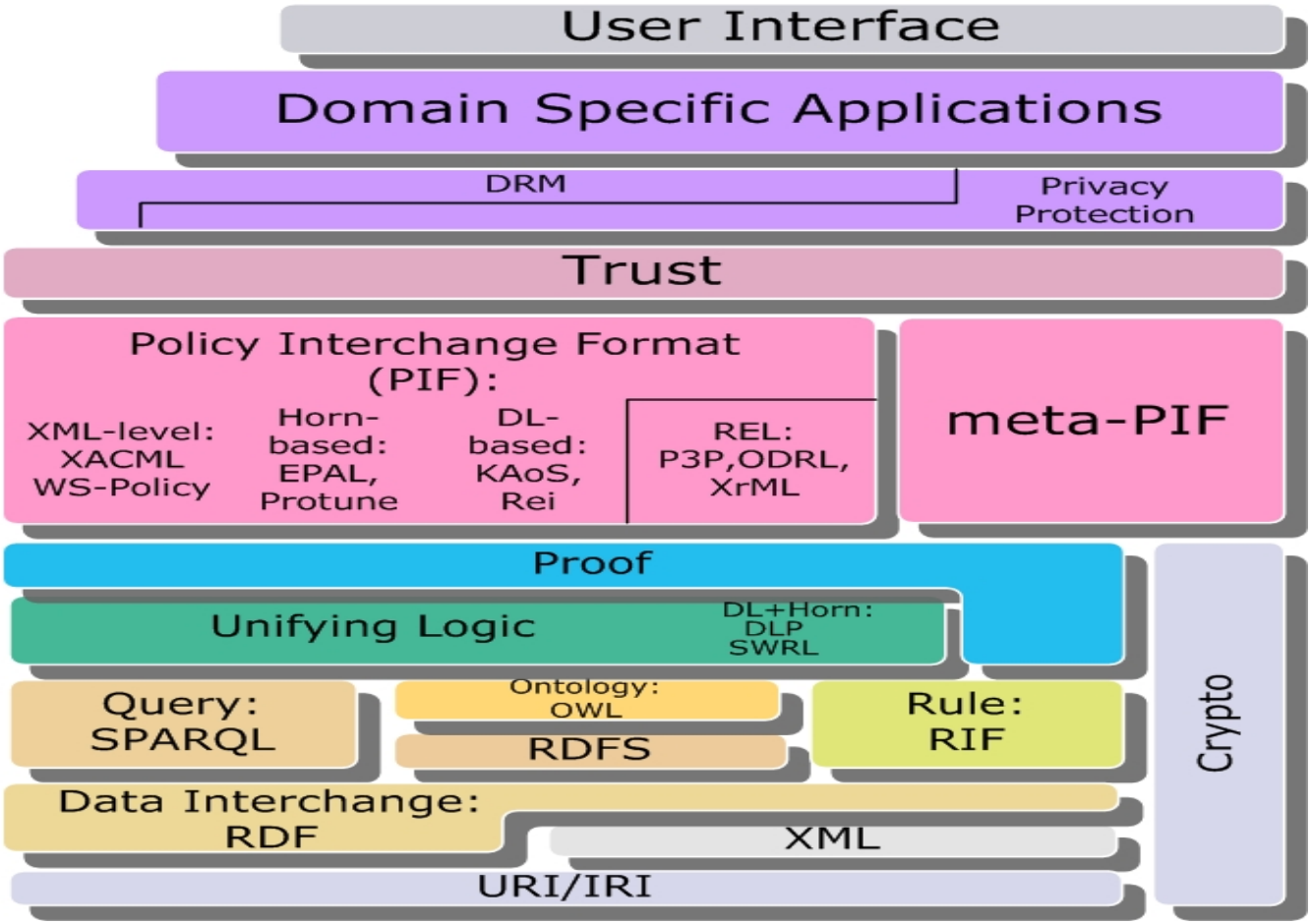
- Policies are formulated and treated as knowledge bases, i.e., ontologies and rules.
- A meta-policy is a policy about policies that provides a set of rules for realizing services needed for the management of policies.



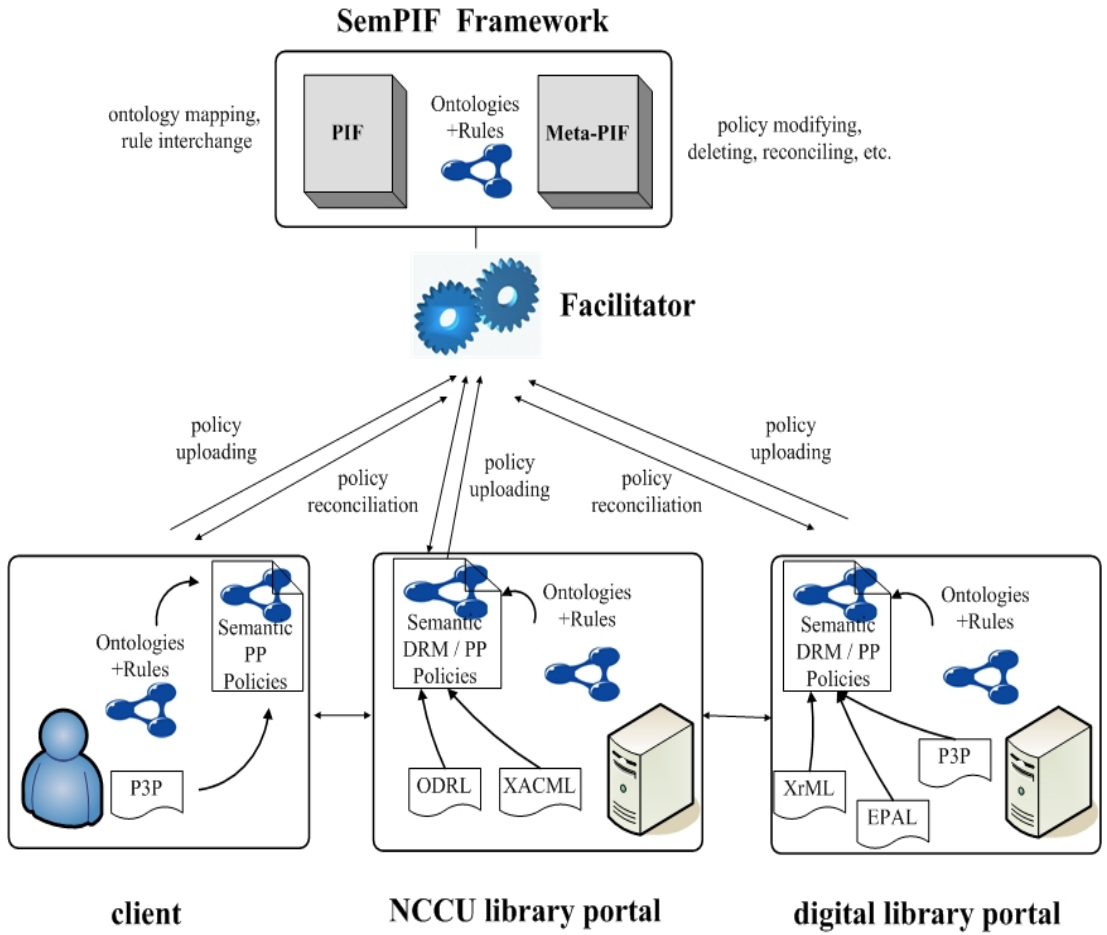
Part II

Semantic Web Layered Architecture


SemPIF Layered Policy Architecture



A Facilitator for Enforcing PIF and Meta-PIF



Part III

A Scenario of Digital Library Subscription


A Scenario of Digital Library Subscription

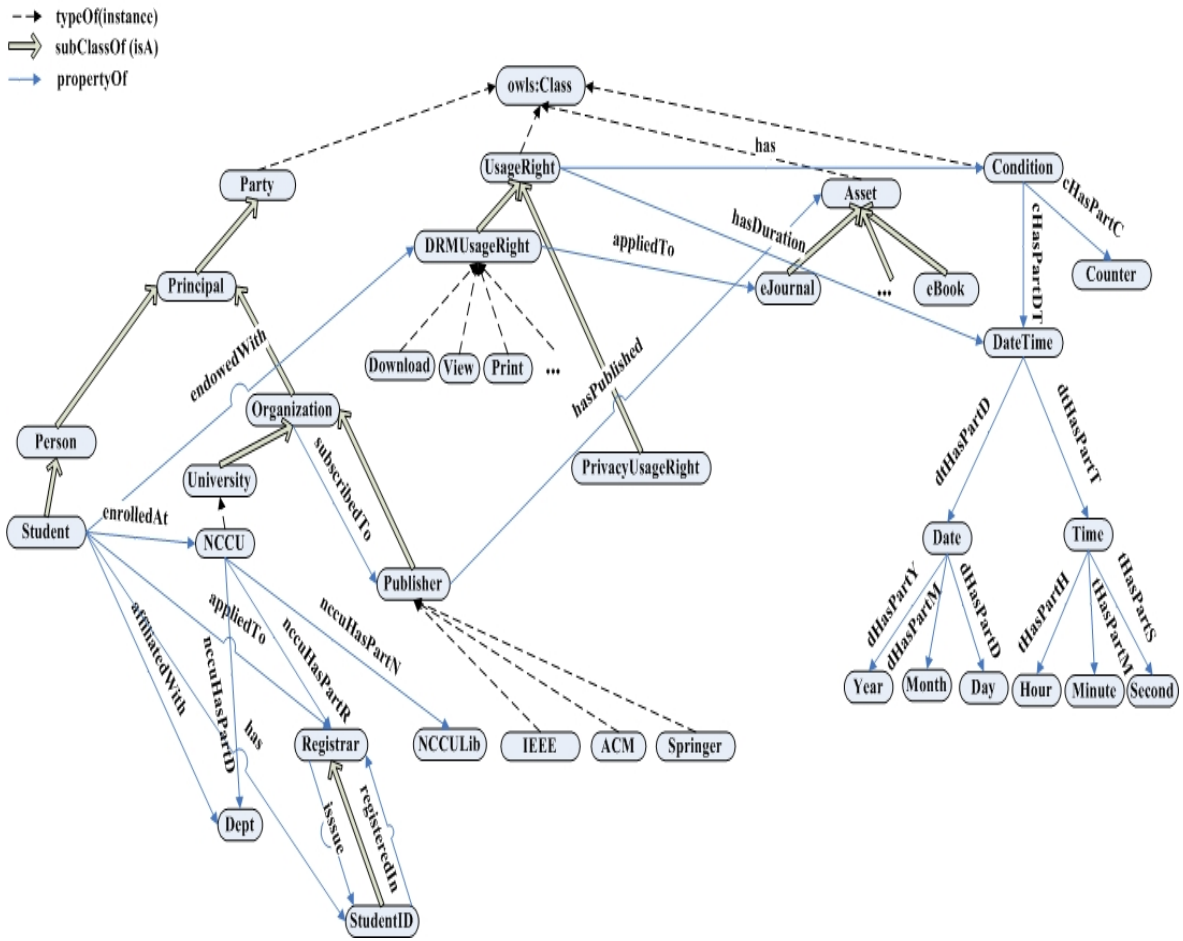
- Server Side:

  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., $\texttt{policy}(\texttt{pp3} - \texttt{John})$, $\texttt{policy}(\texttt{pp4} - \texttt{John})$ to address how and what of his personal data can (or cannot) be collected, retained, or disclosed from a Web server.

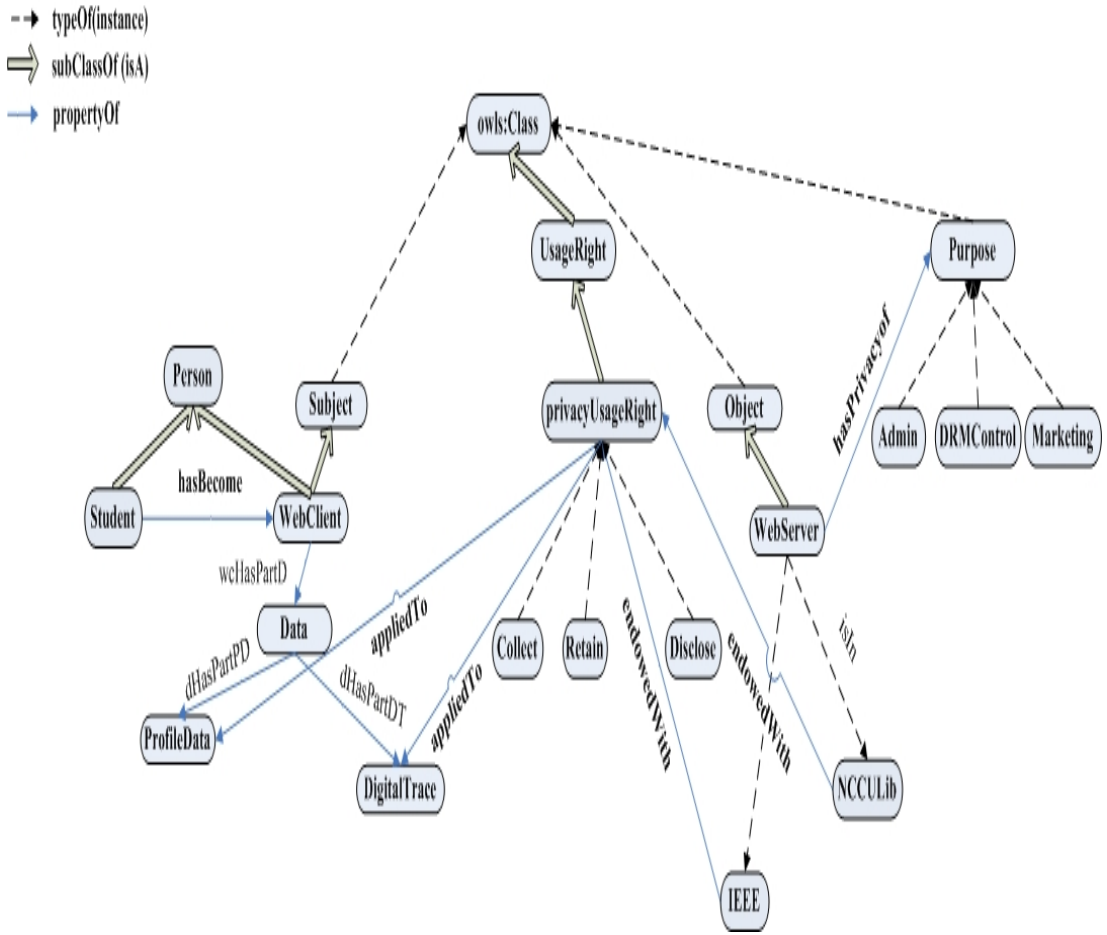

A PIF-based Ontology for DRM Policies



A PIF-based Rule in the IEEE Web Server: policy(drm1 – IEEE)

?st#Student∧?id#StudentID∧?st[own →?id]
∧?uni[nccuHasPartR →?rg]∧?st[enrolledAt →?uni]
∧?rg[issue →?id]∧?uni[nccuhasPartN →?lib]
∧?lib[subscribedTo → IEEE] ∧IEEE[hasPublished →?ejr]
∧IEEE[endowedWith →?rgt]∧?rgt[appliedTo →?ejr] ∧IEEE[delegate →?st]
⟹?*st*[*endowedWith* →?*d*] ∧?st[endowedWith →?v]
∧?st[endowedWith →?p] ∧?d#Download∧?d[appliedTo →?ejr]
∧?v#View∧?v[appliedTo →?ejr] ∧?p#Print∧?p[appliedTo →?ejr].


A PIF-based Ontology for Privacy Protection Policies



A PIF-based Rule in the IEEE Web Server: policy(pp1 – IEEE)

$$?\mathtt{per}[\mathtt{endowedWith} \rightarrow ?\mathtt{drmr}] \wedge ?\mathtt{drmr}[\mathtt{appliedTo} \rightarrow ?\mathtt{ejr}]$$
$$\wedge \mathtt{IEEE}[\mathtt{hasPublished} \rightarrow ?\mathtt{ejr}] \wedge \mathtt{IEEE}[\mathtt{hasPrivacyOf} \rightarrow \mathtt{DRMControl}]$$
$$\wedge ?\mathtt{per}[\mathtt{dHasPartPD} \rightarrow ?\mathtt{prf}] \wedge ?\mathtt{per}[\mathtt{dHasPartDT} \rightarrow ?\mathtt{dif}]$$
$$\wedge ?\mathtt{per}[\mathtt{endowedWith} \rightarrow ?\mathtt{ppr}] \wedge ?\mathtt{per}[\mathtt{delegate} \rightarrow \mathtt{IEEE}]$$
$$\wedge \mathtt{Retain}[\mathtt{hasDuration} \rightarrow =2\mathrm{Month}]$$
$$\wedge ?\mathtt{sdtime}[\mathtt{dHasPartD} \rightarrow ?\mathtt{dtime}] \wedge ?\mathtt{edtime}[\mathtt{dHasPartD} \rightarrow ?\mathtt{dtime}]$$
$$\wedge \mathtt{subtract\text{-}dateTimes}(?\mathtt{edtime}, ?\mathtt{sdtime}) \leq \mathtt{Retain}$$
$$\Longrightarrow \mathtt{IEEE}[\mathtt{endowedWith} \rightarrow ?\mathtt{ppr}] \wedge ?\mathtt{ppr}[\mathtt{appliedTo} \rightarrow ?\mathtt{prf}]$$
$$\wedge ?\mathtt{ppr}[\mathtt{appliedTo} \rightarrow ?\mathtt{dit}].$$


Part IV

SemPIF for Multiple Web Policies