Policy Management in Cloud

**Motivation**
Centralized policy management
- Better view of access policies applied to resources
- Allows users to centralize management of access control policies
- Finds errors or inconsistencies

**Case Study**
- We developed a unified framework to accommodate policy management in one central place.
  - Amazon S3, Dropbox, LinkedIn, Twitter, Flickr

**Limitations of Existing Policy Management Systems**
- Authorization mechanisms are bound to service providers
- There is no unified policy management system
- There is no unified policy management tool
- Access control policies are not interoperable
- Access control policies are heterogeneous

**Our Proposed Solution**
Semantic Web
- We use combination of OWL 2 and SWRL
- High expressiveness
- Reasoning
- Scalable reasoning without sacrificing too much expressive power
- Separation between domain description and policy description
- Heterogeneity management and interoperability

The Cloud Based Policy Management Framework

**Cloud Service Provider (CSP)**
- Local Ontology
- Local Policy Base
- PEP
- Semantic based PDP
- Provider authorization API

**Semantic Based Policy Management Service (SBPMS)**
- Global Ontology
- Global Policy Base
- Provides authorization services and interfaces for cloud users
- Detects and resolves possible conflicts among access policies
- Separates the policies related to each cloud service provider
- Exports them into the associated CSP via the provider authorization API
- Authorization GUI
- Access Request Processing
- The Reasoning Process

Implementation

**Implementation Architecture**
- Java-based
- SBPMS & CSPs
- The authorization API and the provider authorization API are published through RESTful Web service technology
- A RESTful Web service is implemented in the SBPMS side and the CSPs are implemented as RESTful clients.
- Authentication of the provider and server is done using OAuth
- We use Protégé-OWL
- SWRLTab
- In order to reason, we use Jena and Pellet
- Authorization GUI: WebProtege

Conclusion & Future Work

**Conclusion**
- Lessons we learned from a case study implementation
- Limitations of existing approaches
- Developed Semantic based policy management framework
- Proof of concept implementation
- Performance Evaluation

**Future Work**
- Performance of reasoning process
- Design a usable GUI
- Perform user studies

**Publication**
Semantic Based Policy Management for Cloud Computing Environments, International Journal of Cloud Computing (To Appear)