

# Providing Access Control to Online Photo Albums Based on Tags and Linked Data

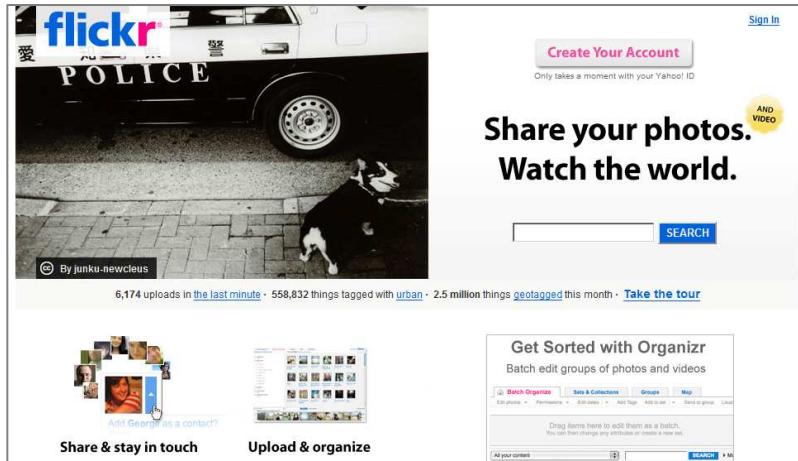
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# Introduction

- Web-based albums for sharing photos are very popular nowadays
- Sharing is the major motivation of using these sites
- Do users always want to share with everyone on the Web?  
(Miller and Edwards 2007)



# Introduction

- Some users may only want to share with a specific group of people
- What kind of access control do we have now?
- Public, Friends, Family, Private, etc.
- Can it be more flexible and more expressive?

### Change privacy settings

You can control how people can interact with your photos and videos in Flickr. Choose who can see it, who can make comments, who can add notes, and who can add tags.

You can also set a default level of privacy for every photo or video you upload into Flickr. [Change your default here.](#)

#### Who can see this photo?

Only You (Private)  
 Your Friends  
 Your Family  
 Anyone (Public)

▼ [Show all privacy settings](#)

#### Who can comment?

Only You  
 Your Friends and/or Family  
 Your Contacts  
 Any Flickr User (Recommended)

#### Who can add notes & tags?

Only You  
 Your Friends and/or Family  
 Your Contacts (Recommended)  
 Any Flickr User

**SAVE**

# Introduction

- Access control can benefit from the combination of the following:

## Tags (Social Web/Web 2.0)

### All time most popular tags

animals architecture art australia autumn baby band birthday black blackandwhite blue bw california car cat chicago china christmas church city clouds dog england europe fall family fashion festival film football france friends fun garden geotagged germany halloween hawaii hiking holiday home house india ireland is lake landscape light live london love macro me me music nature new newyork newyorkcity night night park party people photo photography photos portraits sanfrancisco scotland sea seattle show sky snow

## Linked Data (Semantic Web)

```
- <rdf:RDF>
- <foaf:Person rdf:ID="me">
  <foaf:name>Ching Man Au Yeung</foaf:name>
  <foaf:title>Mr</foaf:title>
  <foaf:givenname>Ching Man</foaf:givenname>
  <foaf:family_name>Au Yeung</foaf:family_name>
  <foaf:nick>Albert</foaf:nick>
  <foaf:mbox_sha1sum>46dd827656a64f32a384fa2fd0803e4d2
  <foaf:homepage rdf:resource="http://www.ecs.soton.ac.uk/~cm"
  <foaf:schoolHomepage rdf:resource="http://www.ecs.soton.ac
  <foaf:openid rdf:resource="http://albertauyeung.myopenid.com/
- <foaf:knows rdf:parseType="Resource">
  <rdf:type rdf:resource="http://xmlns.com/foaf/0.1/Person"/>
  <rdfs:seeAlso rdf:resource="http://people.apache.org/~oshar
  <foaf:mbox_sha1sum>a3f8fd9e643c70000e200a3e9432254
  <foaf:name>Oshani Seneviratne</foaf:name>
</foaf:knows>
- <foaf:knows rdf:parseType="Resource">
  <rdf:type rdf:resource="http://xmlns.com/foaf/0.1/Person"/>
  <rdfs:seeAlso rdf:resource="http://csail.mit.edu/~lkagal/foaf.r
```

## Combining Tags and Linked Data

- Tags are extensively used to describe online photos
- Linked data provide information about users:
  - Social network encoded in FOAF (Friend-of-a-Friend)
  - Membership of research groups, universities and organisations
- Combining the two allows specifying access control rules by:
  - Referring to what the photo is actually about
  - Making use of externally maintained user information
- E.g. ‘photos with the tags “wedding” and “party” can only be accessed by friends specified in my FOAF profile’

## Proposed System

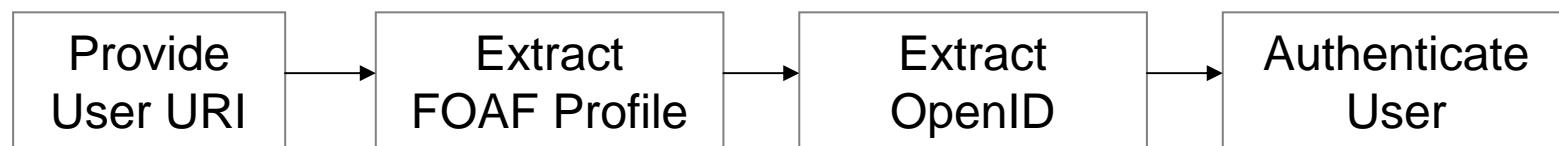
- **Authentication**      FOAF URI, OpenID (or FOAF+SSL)
- **Authorisation**      FOAF social network, other linked data
- **Representation**      Tagging activities represented in RDF  
(Newman 2005)
- **Rules & Reasoning**      AIR Ontology, AIR Reasoner  
(Kagal et al. 2008)
- **User Interface**      Tabulator  
(Berners-Lee et al. 2006)

# Authentication

## 1. Specify OpenID in FOAF

```
<foaf:schoolHomepage rdf:resource="http://www.ecs.soton.ac.uk"/>
<foaf:openid rdf:resource="http://albertauyeung.myopenid.com/">
- <foaf:knows rdf:parseType="Resource">
```

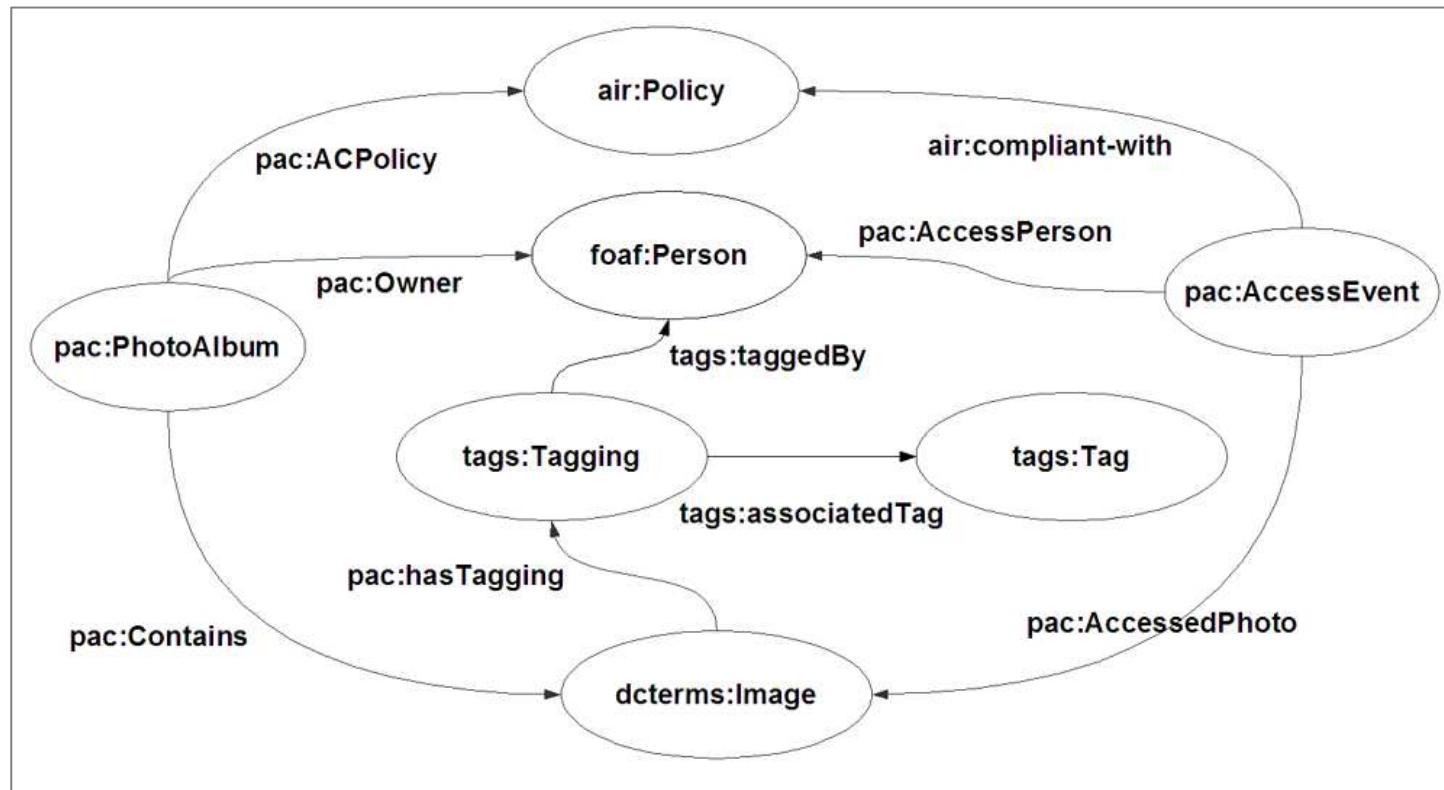
## 2. Authentication



## Objective

To check that the user is really the one represented by the URI  
(We assume that only the user can modify his/her own FOAF profile.)

## Representation

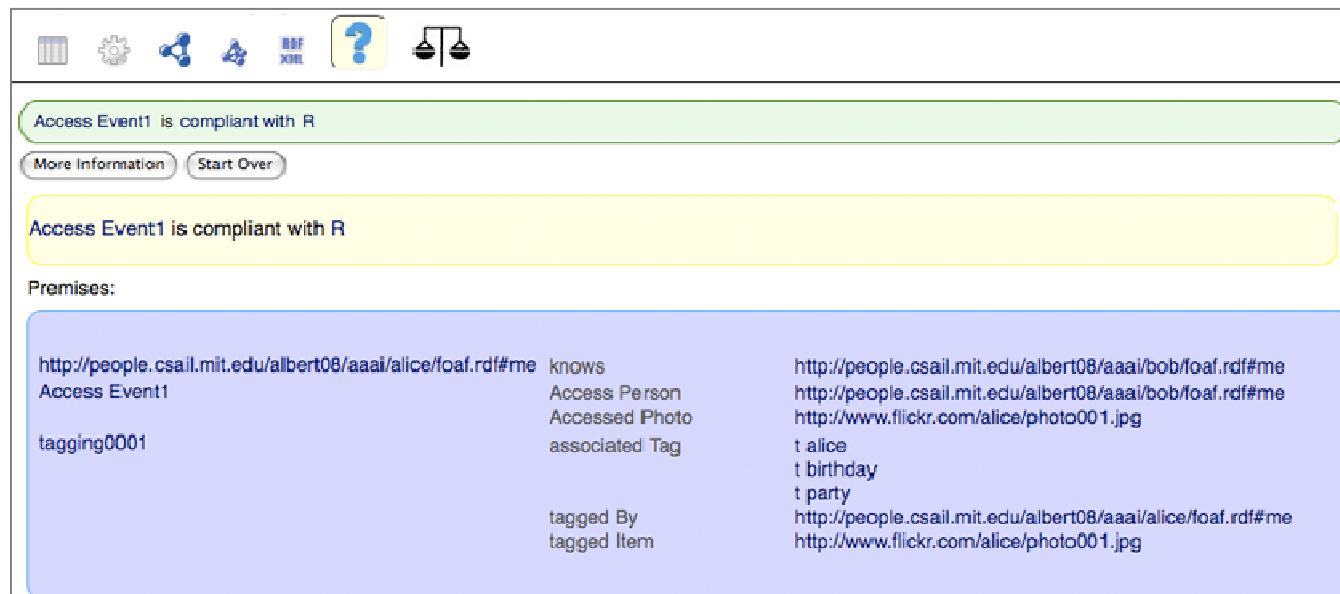


<http://dig.csail.mit.edu/2008/PAC/ontology/pac.rdf>

# Rules and Reasoning

The AIR Policy Language allows access rules to be specified in N3 notation.

AIR provides classes and properties for representing the justification of a reasoning process (Why an event is (not) compliant with the policy?)



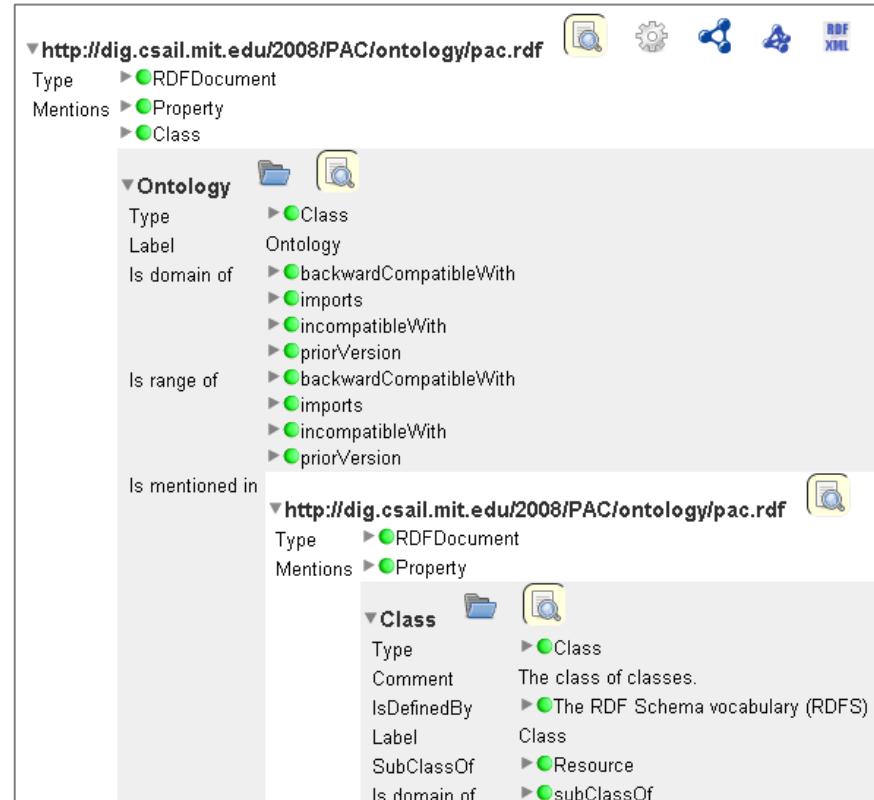
The screenshot shows a user interface for a reasoning engine. At the top, there are several icons: a bar chart, a gear, a network, a document, an XML icon, a question mark, and a scale. Below the icons, a green bar displays the message "Access Event1 is compliant with R". Underneath this bar are two buttons: "More Information" and "Start Over". The main content area is titled "Access Event1 is compliant with R". Below this title, the word "Premises:" is followed by a list of triples. The triples are displayed in two columns:

Predicate	Subject	Object
knows	<a href="http://people.csail.mit.edu/albert08/aaai/alice/foaf.rdf#me">http://people.csail.mit.edu/albert08/aaai/alice/foaf.rdf#me</a>	<a href="http://people.csail.mit.edu/albert08/aaai/bob/foaf.rdf#me">http://people.csail.mit.edu/albert08/aaai/bob/foaf.rdf#me</a>
Access Person		<a href="http://people.csail.mit.edu/albert08/aaai/bob/foaf.rdf#me">http://people.csail.mit.edu/albert08/aaai/bob/foaf.rdf#me</a>
Accessed Photo		<a href="http://www.flickr.com/alice/photo001.jpg">http://www.flickr.com/alice/photo001.jpg</a>
associated Tag		<a href="#">t alice</a>
tagging0001		<a href="#">t birthday</a>
tagged By		<a href="#">t party</a>
tagged Item		<a href="http://people.csail.mit.edu/albert08/aaai/alice/foaf.rdf#me">http://people.csail.mit.edu/albert08/aaai/alice/foaf.rdf#me</a>
		<a href="http://www.flickr.com/alice/photo001.jpg">http://www.flickr.com/alice/photo001.jpg</a>

Justification UI in Tabulator

# User Interface

- Extending Tabulator for the user interface
- A generic RDF data browser
- Support exploration of linked data
- Can be extended to visualise different data by adding customised panes



The screenshot shows a generic RDF data browser interface with two main panes. The top pane displays the ontology <http://dig.csail.mit.edu/2008/PAC/ontology/pac.rdf>. It shows the following information:

- Type: RDFDocument
- Mentions: Property, Class
- Ontology: A folder icon with a magnifying glass, containing:
  - Type: Class
  - Label: Ontology
  - Is domain of: backwardCompatibleWith, imports, incompatibleWith, priorVersion, backwardCompatibleWith, imports, incompatibleWith, priorVersion
  - Is range of: backwardCompatibleWith, imports, incompatibleWith, priorVersion
  - Is mentioned in: <http://dig.csail.mit.edu/2008/PAC/ontology/pac.rdf>

The bottom pane displays the class <http://dig.csail.mit.edu/2008/PAC/ontology/pac.rdf>. It shows the following information:

- Type: RDFDocument
- Mentions: Property
- Class: A folder icon with a magnifying glass, containing:
  - Type: Class
  - Comment: The class of classes.
  - IsDefinedBy: The RDF Schema vocabulary (RDFS)
  - Label: Class
  - SubClassOf: Resource
  - Is domain of: subClassOf

## User Interface

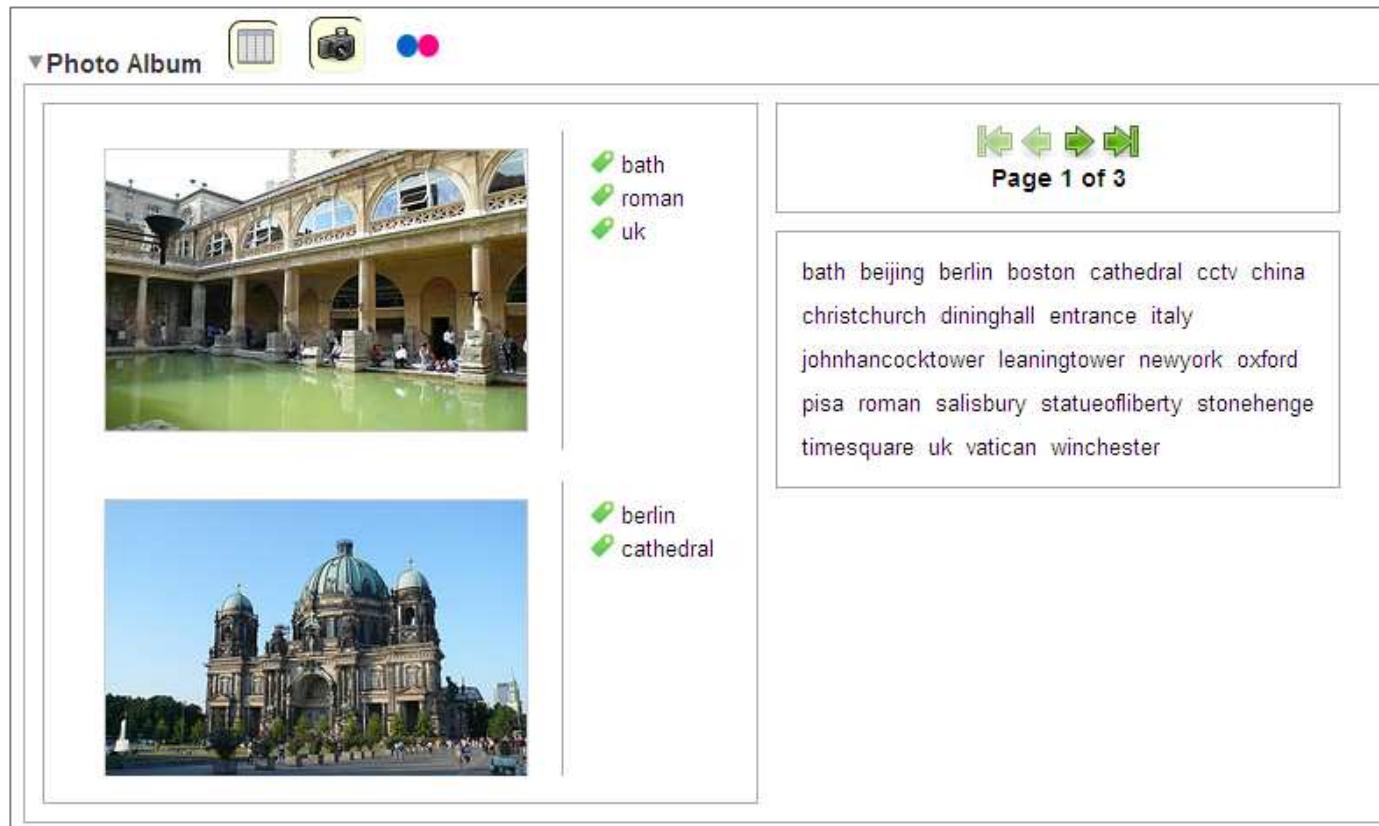
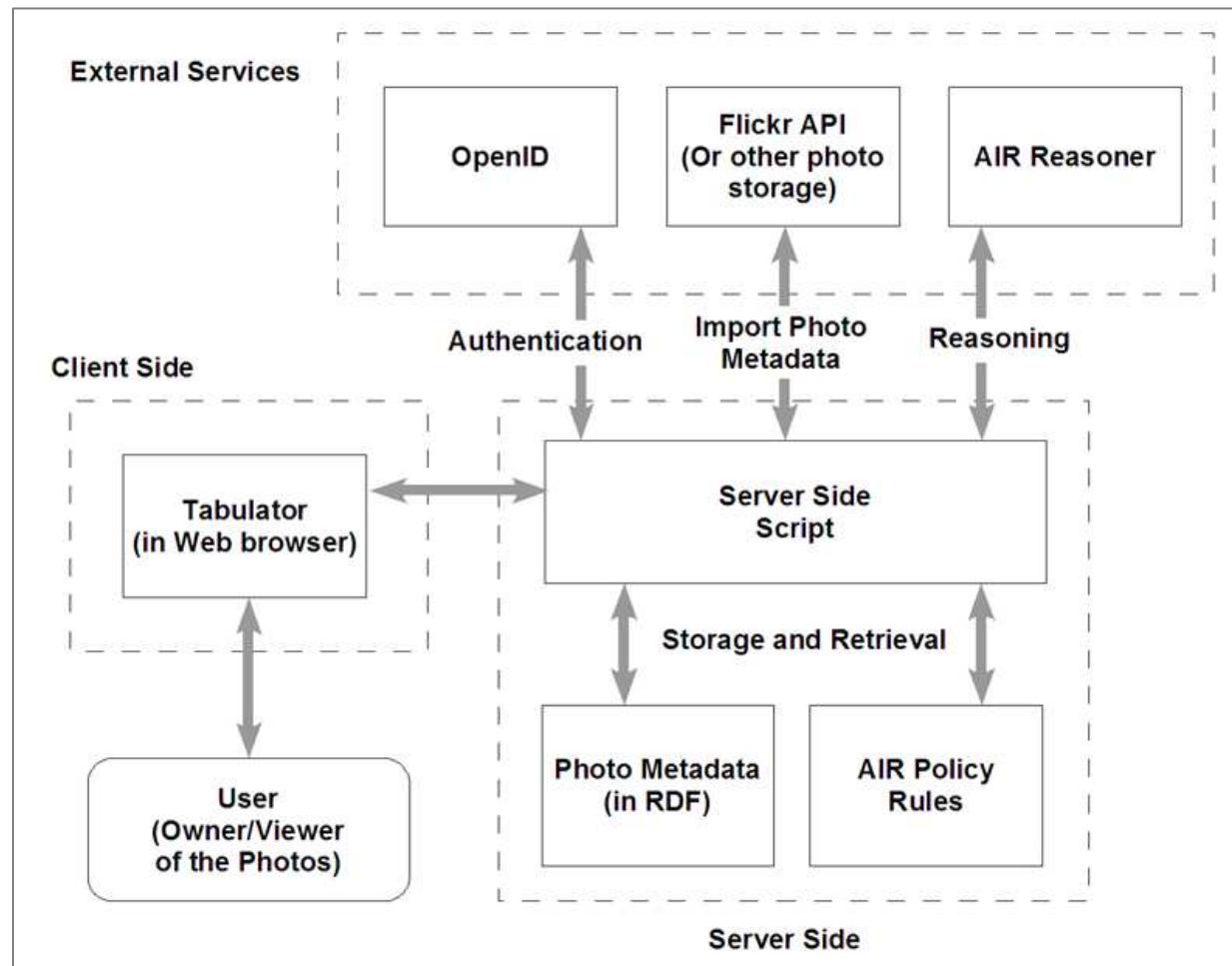


Photo Pane in Tabulator

# System Architecture



## User Case Study

### **Situation:**

- Alice has some photos of her birthday party. They are assigned some tags such as 'alice', 'birthday', 'party'. Bob, a friend of Alice, was in Alice's party and he wants to access the photos owned by Alice.
- Alice has specified her OpenID in her FOAF profile.
- Alice has specified that she 'foaf:knows' Bob in her FOAF profile.
- Both users have OpenID accounts.

## User Case Study

```
:pa01 a pac:PhotoAlbum ;
  pac:Contains <http://www.flickr.com/alice/photo001.jpg>.

:pa01 pac:Owner
  <http://dig.csail.mit.edu/2008/PAC/doc/usecase1/alice/foaf.rdf#me> .

:pa01 pac:ACPolicy
  <http://dig.csail.mit.edu/2008/PAC/doc/usecase1/alice/rules.n3#R> .

<http://www.flickr.com/alice/photo001.jpg> pac:hasTagging :tagging0001 .

:tagging0001 tag:associatedTag :t_alice, t_birthday, :t_party ;
  tag:taggedBy
    <http://dig.csail.mit.edu/2008/PAC/doc/usecase1/alice/foaf.rdf#me> ;
  tag:taggedResource <http://www.flickr.com/alice/photo001.jpg> ;
  a tag:Tagging .
```

Photo album data extracted from Flickr

## User Case Study

```
forAll :Event, :User, :Owner, :Tagging, :Photo .  
  
:R a air:Policy;  
    air:rule [  
        air:label "Photo Access Control Rule";  
        air:pattern {  
            :Event pac:AccessPerson :User .  
            :Event pac:AccessedPhoto :Photo .  
            :Photo pac:hasTagging :Tagging .  
            :Tagging tags:taggedResource :Photo ;  
                tags:taggedBy :Owner ;  
                tags:associatedTag my:t_birthday ;  
                tags:associatedTag my:t_party .  
            :Owner foaf:knows :User .  
        };  
        air:description (:E " is compliant with " :R);  
        air:assert {:E air:compliant-with :R.};  
    ].
```

Access control policy specified by Alice

## User Case Study

The server side script generates access events represented in N3.

```
:AccessEvent1 a pac:AccessEvent ;  
    pac:AccessPerson  
    <http://dig.csail.mit.edu/2008/PAC/doc/usecase1/bob/foaf.rdf#me> ;  
    pac:AccessedPhoto <http://www.flickr.com/alice/photo001.jpg> .
```

The AIR reason returns whether the access event is compliant with the access control policy.

```
temp:AccessEvent1 air:compliant-with  
    <http://dig.csail.mit.edu/2008/PAC/doc/usecase1/alice/rules.n3#R> .
```

## Advantages

- Access control rules are specified using tags, which describe the features of the photos.
- Depend on external information about user membership in groups. (e.g. friends, member, participate, etc.)
- User no longer needs to maintain a list of friends, and do not need to comply all those list of membership.
- Allow users to take advantage of linked data for retrieval and access control rule specification.

## Challenges

- How can we benefit more from linked data?
  - E.g. Binding geo:London to the tag 'london', allow rules like 'User are allowed to access photos about the U.K'.
- How can we allow users to create rules easily?
  - Providing a GUI for policy creation is a UI challenge
  - Existing solution (e.g. policy parser) is very primitive
- And many other implementation issues...

## Outlook

- Access control is only one of the many applications of this approach
- It represents a form of *contextualised/personalised* data browsing
- Different users, depending on their *identities/affiliations*, obtain a subset of data that is delivered by some rules specified by the owner of the data

# Thank You!

Albert Au Yeung

<http://users.ecs.soton.ac.uk/cmay06r/>