

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

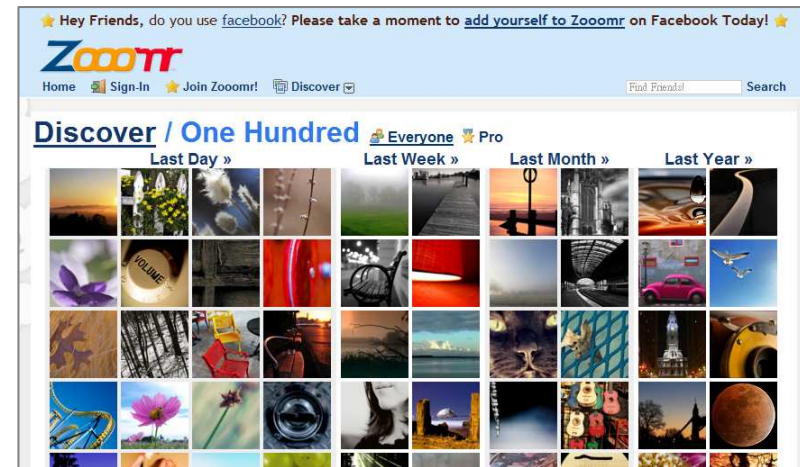
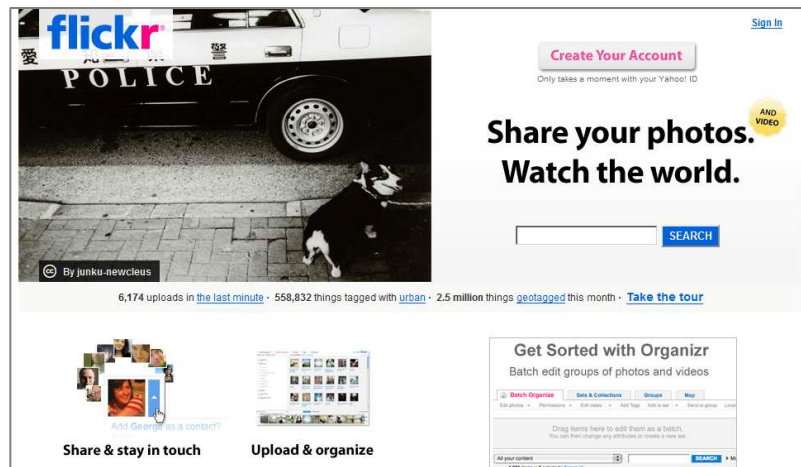
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## Introduction

- 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?**

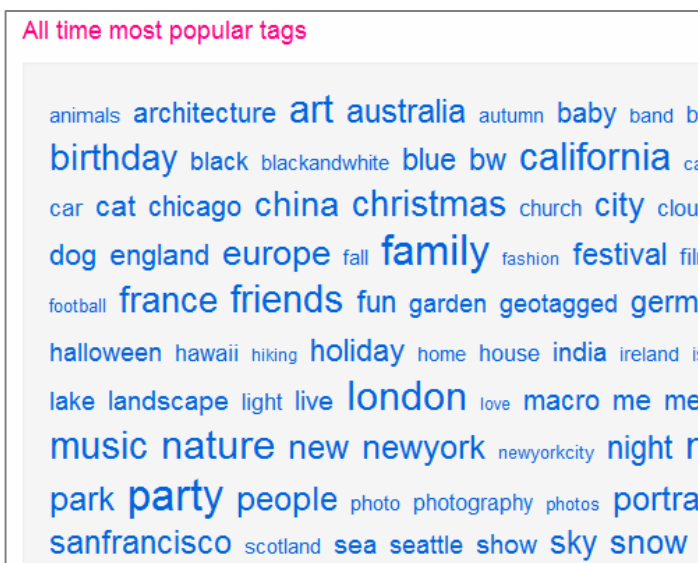
☐ Only You  
☐ Your Friends and/or Family  
☒ Your Contacts (Recommended)  
☐ Any Flickr User

**SAVE**

## Introduction

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

### Tags (Social Web/Web 2.0)



### 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/~oshari
  <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

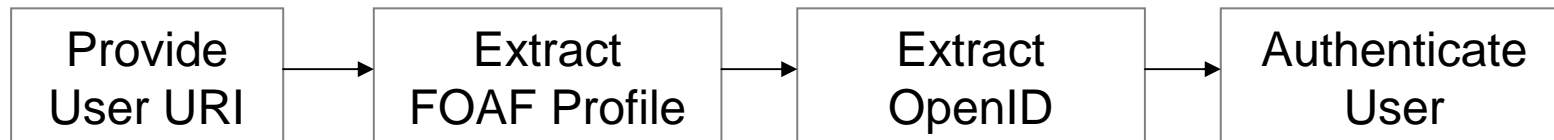
- **Authentication** FOAF URI, OpenID (or FOAF+SSL)
- **Authorisation** FOAF social network, other linked data
- **Representation** Tagging activities represented in RDF (Newman 2005)
- **Rules & Reasoning** AIR Ontology, AIR Reasoner (Kagal et al. 2008)
- **User Interface** Tabulator (Berners-Lee et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

## Authentication

### 1. Specify OpenID in FOAF

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

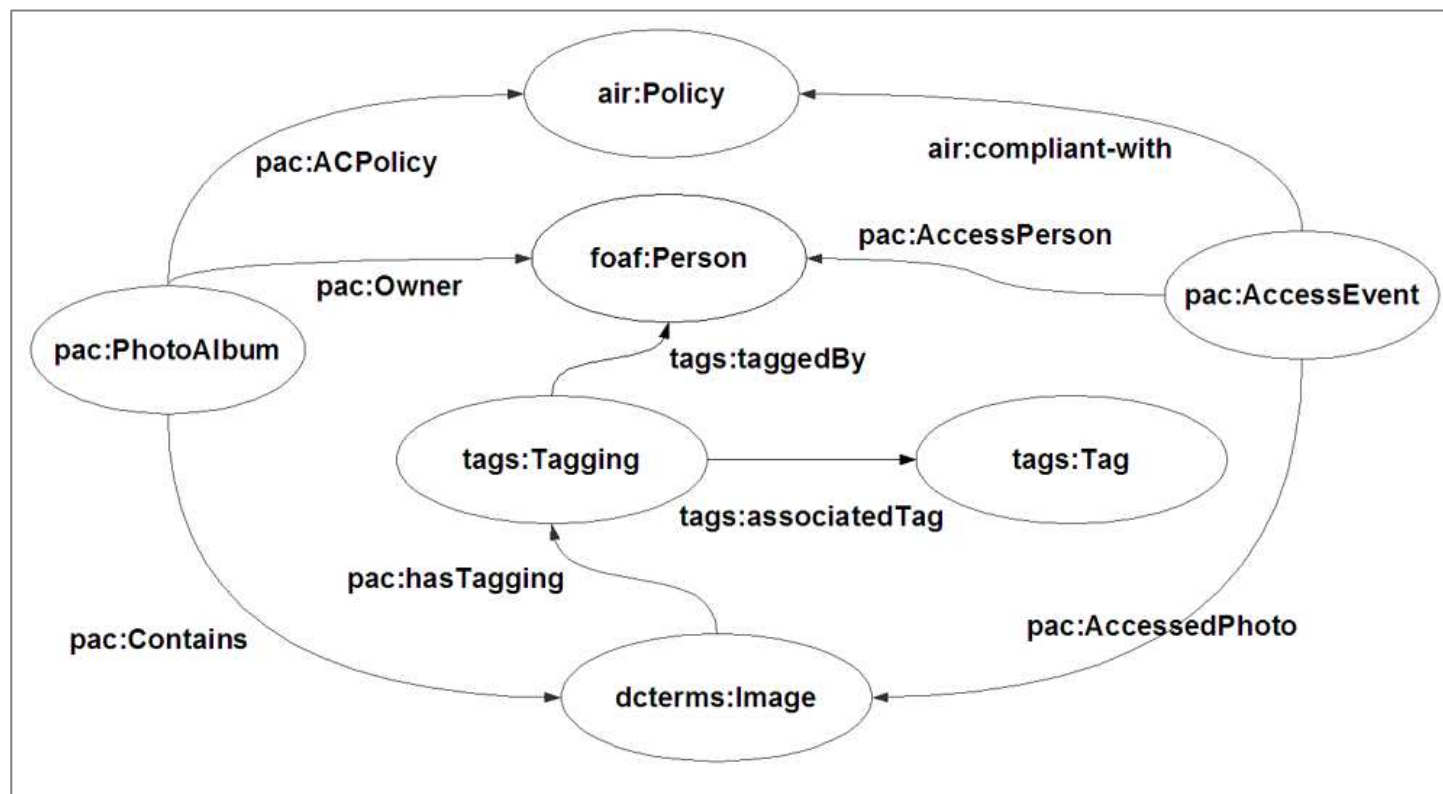
### 2. Authentication



### 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?)

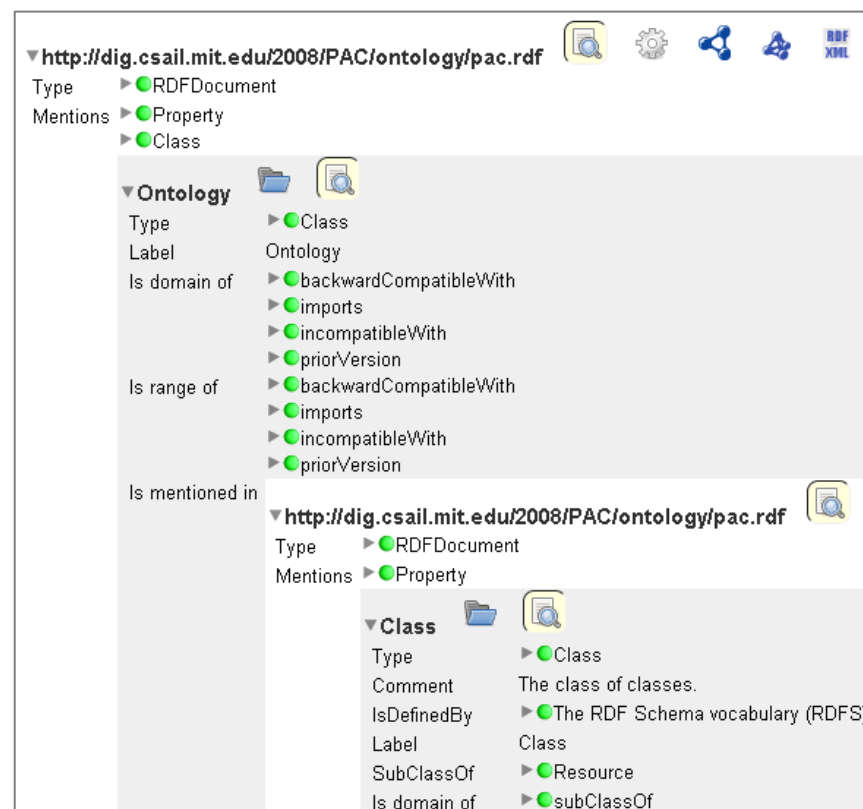
The screenshot displays a web interface for justifying access decisions. At the top, a toolbar contains icons for a table, settings, a graph, a document, an RDF/XML icon, a question mark, and a balance scale. Below the toolbar, a green bar states "Access Event1 is compliant with R". Underneath this bar are two buttons: "More Information" and "Start Over". A yellow bar below the green one also states "Access Event1 is compliant with R". The main section, titled "Premises:", contains a light blue box with a table of logical premises.

<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>	knows	<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 Event1	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>
tagging0001	associated Tag	t:alice
		t:birthday
		t:party
	tagged By	<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>
	tagged Item	<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

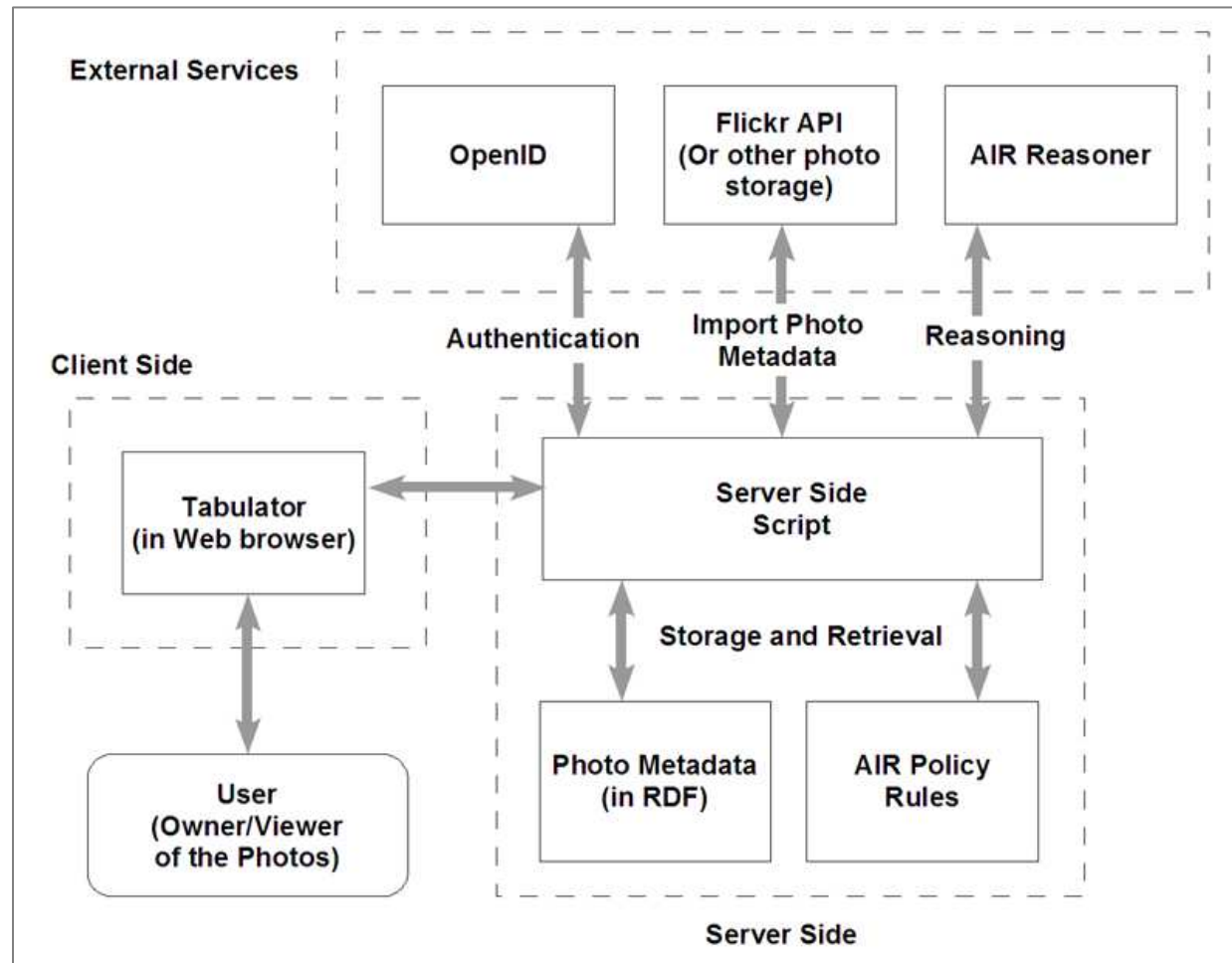


## User Interface



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!**

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