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?
**Introduction**

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

### Tags (Social Web/Web 2.0)

- Animals
- Architecture
- Art
- Australia
- Autumn
- Baby
- Band
- Birthday
- Black
- Black and white
- Blue
- Bw
- California
- Car
- Cat
- Chicago
- Christmas
- Church
- City
- Cloud
- Dog
- England
- Europe
- Fall
- Family
- Fashion
- Festival
- Film
- Football
- France
- Friends
- Fun
- Garden
- Gadget
- Groom
- Halloween
- Hawaii
- Hiking
- Holiday
- Home
- House
- India
- Ireland
- Lake
- Landscape
- Light
- Live
- London
- Love
- Macro
- Me
- Music
- Nature
- New
- New York
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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 Profile Example]

2. Authentication

![Authentication Flowchart]

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

**Representation**

![Diagram showing the relationship between different entities such as Policy, Person, Album, AccessEvent, etc., and their associated properties like tags:taggedBy, tags:associatedTag, etc.]

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?)

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

[Diagram showing system architecture with components such as OpenID, Flickr API, AIR Reasoner, Tabulator, Server Side Script, User, Photo Metadata, AIR Policy Rules, and External Services]
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 ;

:pa01 pac:Owner

:pa01 pac:ACPolicy


: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


:R a air:Policy;
  air:rule [
    air:label "Photo Access Control Rule";
    air:pattern {
      :Photo pac:hasTagging :Tagging .
      :Tagging tags:taggedResource :Photo ;
        tags:taggedBy :Owner ;
        tags:associatedTag my:t_birthday ;
        tags:associatedTag my:t_party .
    }
  ];
  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
```

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

```
temp:AccessEvent1   air:compliant-with
```
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.
- Differences 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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