

## **Patterns for Secure Social Networks in Web 2.0**

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### **ABSTRACT**

A social network is a structure of individuals and organizations, which are connected by one or more types of interdependency, such as friendship, affinity, common interests or knowledge. Social networks use web 2.0 technology, which is mostly based on a service-oriented architecture. We are studying patterns for social networks in this environment. A pattern is an encapsulated solution to a software problem in a given context. We present here two basic patterns for this environment: the Participation-Collaboration Pattern describes the functionality of the collaboration between users in applications and the Collaborative Tagging Pattern is useful to share content using keywords to tag bookmarks, photographs and other contents.

### **1. INTRODUCTION**

The early Internet, now referred to as Web 1.0, significantly lowered the cost of publishing content to a global audience. Anyone with an Internet connection could follow links to access content. The content of websites was generally controlled by the individual, company or organization that created it. Software tools were developed for contributing content and using standards for information and data exchange. E-mail and instant messaging tools made possible keeping in touch with existing contacts, and forum and chat-room spaces made possible to discover and temporarily interact with new people or groups.

Web 1.0 has been followed by the emergence of Web 2.0 which allows anyone with a web connection to write as well as read. Online publishing tools have been extremely simplified and the cost of publishing to a global audience has become almost free. High-powered search, user controlled content-tagging to supplement formal classifications, and user-generated content have all emerged to make it much easier to navigate topic-driven, or even person-driven cross sections of the web. Rather than surfing around a single site for information on a given topic, users hop from site-to-site, or find the content brought together from many different sources and sites conveniently presented to them.

The speed at which content is published has accelerated even more, and contents are contained within "flows" of media. Web 2.0 has supported the emergence of social media, in which individuals and organizations can easily publish media, discuss it online, and in which media objects can act as starting places for people to connect, communicate, and network.

The Social Web and its Social Network Services are based upon Web 2.0. By making the social object not an item of media but a personal profile, the online experience has changed from one of consuming and contributing content to one of participating in a shared space with friends and contacts. Social network sites are structured as personal networks, with the individual at the center of their own community. People and their online interactions are captured as published content on the web in a way that allows content and people-as-content to be traversed through social, rather than thematic links. New categories of communication such as broadcast, narrowcast and

private messaging have been created. Virtually everything is read/write with space for added metadata and comments.

Software development in this rich environment presents new challenges because of its richness and the need for security. Patterns are a way to simplify software development which we have been using in our work. A pattern is an encapsulated solution to a software problem in a given context and a good catalog of patterns can improve the quality of software. (Craston, 2009)

We present here two patterns about social networks in the context of Web 2.0 technologies: the Participation-Collaboration Pattern describes the functionality of the collaboration between users in applications and the Collaborative Tagging Pattern is useful to share content using keywords to tag bookmarks, photographs and other contents.

## **2. THE PARTICIPATION-COLLABORATION PATTERN**

### **Intent**

Describe the functionality of the collaboration between users participating in social networks, together with access and rights restrictions.

### **Example**

A small company wants to create a manual covering the use of one of its products. The traditional approach is to gather a small set of experts to write it, hopefully reducing the potential for costly errors. However, manuals face a market of readers with different skill levels, and the company's writers may not always get everything right. Customers often know what they need better than the company does, but the flow of information has traditionally gone from the publisher to the customer, rather than the other way around. It is hard then to produce good-quality manuals (Hinchcliffe, D, et al, 1999).

### **Context**

This pattern can be useful when a group of people has a common interest in sharing and communicating information about a specific subject. They all have access to the facilities of an environment such as the one provided by Web 2.0.

### **Problem**

There are tasks where we need the collaboration of a large variety of people, who can provide unique points of view or expertise. How do we share information among people in different places and with different areas of expertise so they can work together?

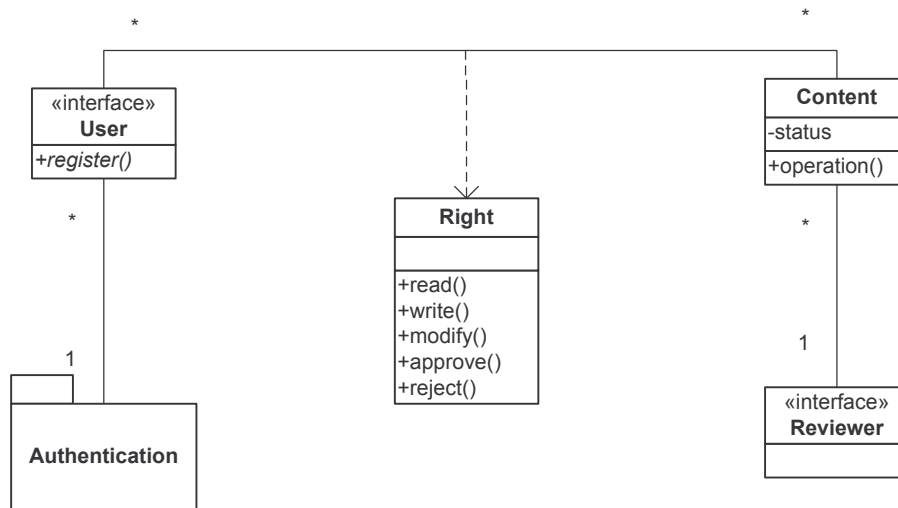
The solution for this problem is affected by the following **forces**:

- There are issues that can be solved better when many people collaborate, we should provide a convenient way for them to interact.
- Consistent participation may provide a platform for some users to be recognized as experts. We want to know who are the users with a high level of expertise in some area.
- A person needs to be designated to accept or reject the changes in the content made by the users; otherwise the collaboration may be overwhelmed by some users or become corrupted with spurious content.
- We should control who can propose new content to avoid spammers and similar input providers.

### **Solution**

An open process may provide better results than having only a few people provide their knowledge and we want to let as many people as possible to participate under controlled conditions. Each collaboration should be received before acceptance. Only registered users should be able to add content.

Figure 1 presents the class diagram for this pattern. The **User** is authenticated by an **Authentication** system (pattern) (Brown,et al,1999),. The User has specific **Rights** with respect to the **Content**. The **Reviewer** approves the content provided by the user.



**Figure 1: Class Diagram for Participation and Collaboration pattern**

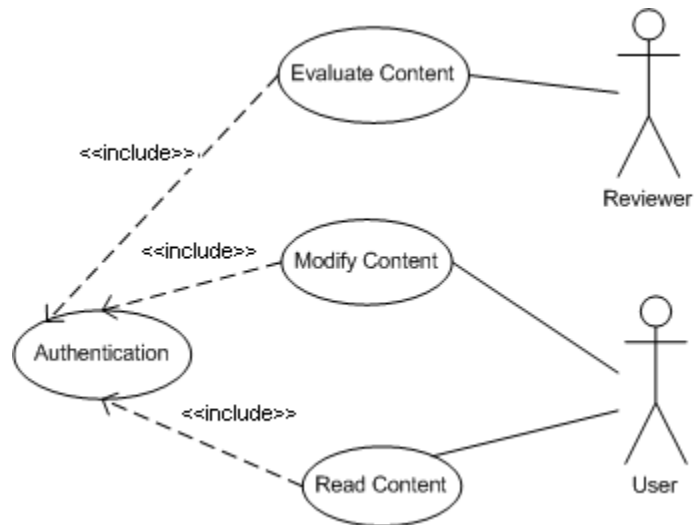
**Dynamics**

The class diagram supports the use cases shown in Figure 2.

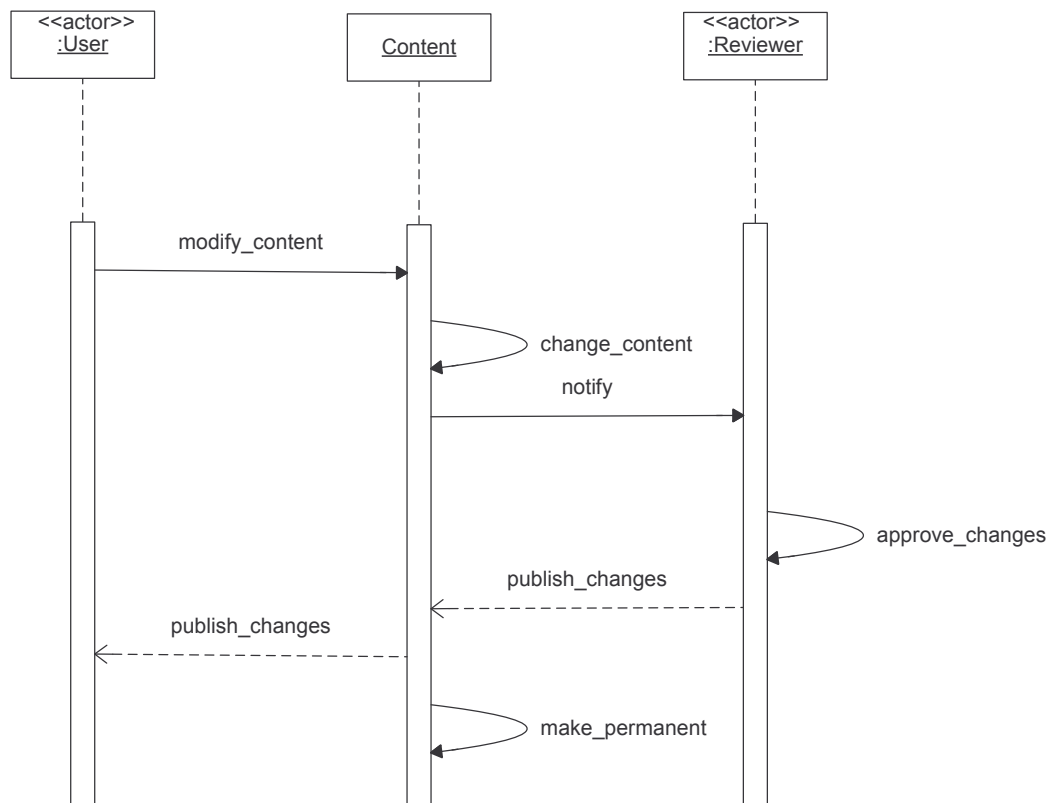
The sequence diagram of Figure 3 shows the use case modify content: First the user logs in the platform, then she can make changes but those changes are not published until the reviewer approves them.

**Implementation**

- Using the facilities of Web 2.0 implement a collaborative platform through which users or application actors can contribute knowledge, code, facts, and other material relevant to a discussion. The material can be made available, possibly in more than one format or language, and participants can then modify or append to that core content.
- The collaborative platform allows the user to modify an article, upload images, videos and audio. To do that the user must have an account to be identified to the reviewer, it is important to use an appropriate authentication system.



**Figure 2: Use Case Diagram for Participation and Collaboration pattern**



**Figure 3: Sequence Diagram for the use case modify content**

**Known Uses**

- Platforms of collaboration such as Wikipedia, a free web encyclopedia.
- Facebook Wiki, a technical reference for developers interested in the Facebook Platform.
- Facebook Platform is a standards-based Web service with methods for accessing and contributing data (Facebook Wiki 2009)

### **Related Patterns**

- The Authenticator pattern (Brown, et al, 1999), is used to authenticate the users of the system.
- The Role-Based Access Control (RBAC) pattern (Fernandez, E.B, et al, 2001) is used to define the rights of the users with respect to the contents.

### **Consequences**

This pattern has the following advantages:

- Allows users in any place to modify content; they can share text, videos, images and can discuss any topic trying to collaborate and give different ideas.
- Experts demonstrate their knowledge or talent about certain topic and they can be recognized in their field of expertise.
- We can keep out spammers and other undesirable users.

Possible disadvantages include:

- Sometimes the reviewers don't know about a specific topic and they can eliminate important or useful content. They can also be biased. This means the reviewer should be carefully selected.

## **3. THE COLLABORATIVE TAGGING PATTERN**

### **Intent**

The Collaborative Tagging pattern makes content more meaningful and useful by using keywords to tag bookmarks, photographs, and other content.

### **Example**

Consider a person tagging a photograph of broccoli. One person might label it "cruciform," "vegetable," or "nutritious," while another might tag it "gross," "bitter," or worse. We need some way to attach information to this item as a guide to possibly interest users. (Hinchcliffe, D, et al, 1999)

### **Context**

People in the internet need to search different kinds of content such as pictures, text, content, audio files, bookmarks, news, items, websites, products, blog posts, comments, and other items available online. They may want an item for a variety of reasons.

### **Problem**

Often, we need to use a search system to find resources on the Internet. The resources must match our needs, and to find relevant information, we need to enter search terms. The search system compares those terms with a metadata index that shows which resources might be relevant to our search. The primary problem with such a system is that the metadata index is often built by a small group of people who determine the relevancy of those resources for specific terms (Hinchcliffe, D, et al, 1999). The smaller the group that does this, the greater the chance that the group will apply inaccurate tags to some resources or omit certain relationships between the

search terms and the resources' semantic relevancy. How do we let users guide the search for people with related interests?

The solution is affected by the following **forces**:

- The number of ways to classify an item is undefined and the choices can be as different as the users and all of these are valid in some sense.
- A specific item can belong to an unlimited number of categories. We want to have a variety of ways to find items.

### Solution

Let the users add tags to items to indicate categorizations of interest to the members of the group.

Figure 4 shows the class diagram for this pattern. The **User** belongs to a **Domain** and applies **Tags** from this domain to **Resources**. A User is any human, application, process, or other entity that is capable of interacting with a resource. A domain is the total set of objects and actions that the language provides. Resource denotes any digital asset that can have an identifier. Examples of resources include online content, audio files, digital photos, bookmarks, news items, websites, products, blog posts, comments, and other items available online.

Figure 5 shows the use cases related to this pattern. Figure 6 shows a sequence diagram for the use case Tag a resource: First the user selects a resource, he then makes a semantic classification of the resource by adding a tag. The user has freedom to assign any word to a resource. After the user tags a resource, the domain changes its content and people can start to use the tag for searches.

### Known Uses

- **Flickr** has implemented the capability to have many humans provide tags for digital photographs. (Wikipedia 2009)
- **Technorati** lets individuals use tags for blog articles. It also it has published a microformat for tags in blog entries and indexes blogs using those tags (and category data). (Technorati 2009)
- **Slashdot's** beta tagging system lets any member place specific tags on any post. (Slashdot 2009)

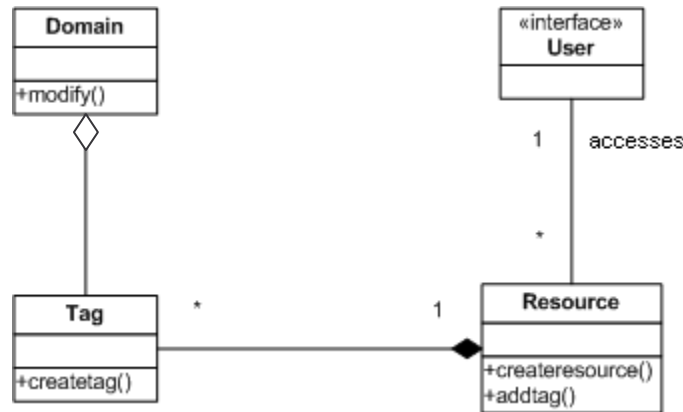


Figure 4: Class Diagram for the Collaborative Tagging Pattern

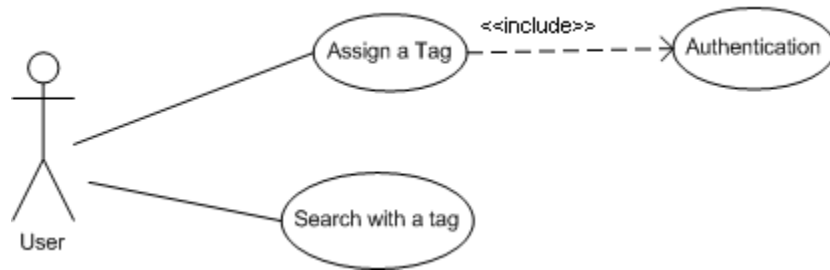


Figure 5: Use Case Diagram for the Collaborative Tagging Pattern

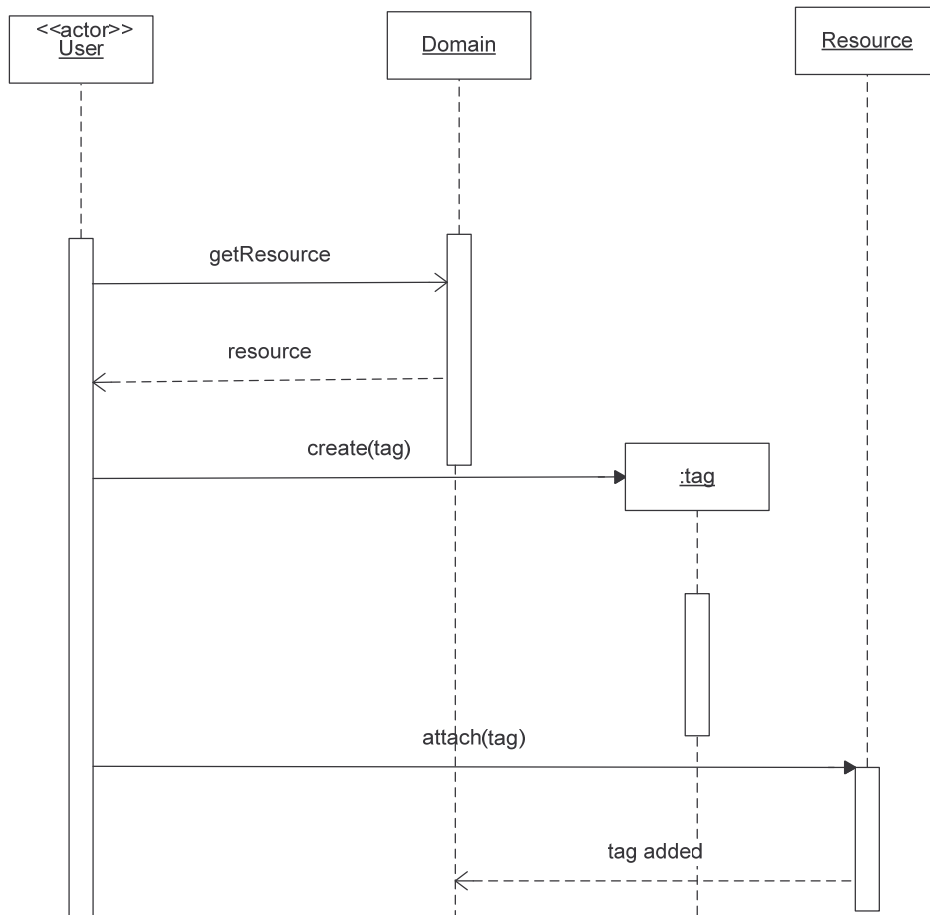


Figure 6: Sequence diagram for assign tag use case

**Consequences**

This pattern has the following advantages:

- Users can classify their collections of items in any way that they find useful.
- When users try to find an item, the results have more variety and meanings.
- Tags provide a way to measure aspects such as directionality and centrality.

Possible liabilities are:

- When users can freely choose tags, the resulting metadata can include the same tags used with different meanings and multiple tags for the same concept, which may lead to inappropriate connections between items and inefficient searches for information about a subject.
- There is no explicit information about the meaning of each tag.
- The personalized variety of terms can present challenges when searching and browsing.

#### 4. CONCLUSIONS

We presented two basic patterns for social network interaction: the Participation-Collaboration Pattern describes the functionality of the collaboration between users in applications, while the Collaborative Tagging Pattern is useful to share content using keywords to tag bookmarks, photographs and other contents. These patterns will be valuable for web designers defining the architecture of new systems.

Future work will include:

- The rich user experience patterns: Often discussed in conjunction with the Rich User Experience (RUE) is the Rich Internet Application (RIA). The term itself suggests a type of application that is connected to the Internet and facilitates a RUE (Hinchcliffe, D, et al, 1999).
- The Mashup pattern: A mashup is a web page or application that combines data or functionality from two or more external sources to create a new service. The term mashup implies easy, fast integration, frequently using open APIs and data sources to produce results that were not the original reason for producing the raw source data (Hinchcliffe, D, et al, 1999; Maximilien, 2008).

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