RSS as a Distribution Medium for Geo-spatial Hypermedia

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ABSTRACT

This paper describes how the XML based RSS syndication formats used in weblogs can be utilized as the distribution medium for geo-spatial hypermedia, and how this approach can be used to create a highly distributed multi-user annotation system for geo-spatial hypermedia. It is demonstrated, how the HyCon annotation model [2] can be formulated as a RSS 2.0 feed and how such feeds allow annotation threads to be distributed across multiple weblogs and servers.

Categories and Subject Descriptors: H.5.4 [Information Interfaces and Presentation]: Hypermedia

General Terms: Design, Experimentation, Standardization

Keywords: Geo-spatial Hypermedia, HyCon, RSS, Weblogs, Moblogs

1. INTRODUCTION

Weblogs ("blogs") are the widespread phenomena of online journals. The scope of these journals ranges from personal notebooks to shared community discussion boards and online journalism sites typically organized as a series of articles linked together in reverse-chronological order. Most blog systems support critical reading by allowing blog readers to comment on blog posts either through built-in annotation systems or through special services such as Pingback[1] or Trackback[2] whereby comments and annotations can be distributed across multiple blogs. Syndication files and meta data containing blog post summaries are distributed as lightweight XML files called "RSS feeds". RSS is a family of XML file formats designed to allow client programs to automatically check for changes on Web sites, fetch updated blog posts on behalf of the user, or even combine RSS feeds from different sources into new Web pages.

[1] `http://www.hixie.ch/specs/pingback/pingback-1.0`
[2] `http://www.sixapart.com/pronet/docs/trackback_spec`

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The combination of the blog phenomenon and connected mobile devices yields the "moblog": blogs created from photos, videos, and author's impressions captured with a mobile device. While the concept of such personal ad-hoc diaries is by no means a new one [4, 5] (i.e., it may be regarded as an extension of wearable computing) the availability of cheap mobile devices, such as smart phones, have made it commonplace. However, so far smart phones have mainly been used as authoring tools for the blog maintainers, e.g., through simple mail-to-Web gateways.

Geo-spatial annotation- and hypermedia systems [1, 6] share several similarities with moblogs in that they support users in producing in-situ information linked to their current place or context. Apart from authoring, these systems support browsing of information related to the current location, and are often full-featured hypermedia systems,

We describe in this paper how RSS, commonly used in blog and moblog systems, can be utilized as the distribution medium for geo-spatial hypermedia data, and how this approach can be used to create a highly distributed multi-user annotation system for geo-spatial hypermedia. Using the simple RSS format has several perspectives: (1) Geo-spatial hypermedia systems can enjoy the same lightweight distribution medium as blogs, which supports high distribution of data on different servers and high scalability. (2) While being used as the data format for the geo-spatial hypermedia system, the RSS data can still be used as the basis for normal moblogs, thus supporting access to the blog post from both the Web and from geo-spatial systems. (3) Information filtering is for free: users simply subscribe to the feeds providing interesting information. The remainder of the paper discuss how a geo-spatial hypermedia client, the HyConExplorer/J2ME for smart phones [1], has been modified to support RSS feeds as annotation data, and how the RSS format itself can be augmented to include support for geo-spatial annotation structures.

2. THE HYCON PLATFORM

The HyConExplorer/J2ME system [1] is a geo-spatial hypermedia client developed for connected, mobile Java enabled devices such as smart phones. HyConExplorer/J2ME is built on the HyCon framework [2] and uses the HyCon hypermedia model as its native data model. The annotation facilities in the system allow places and objects in the physical world to be tagged with Web links and multimedia content such as text, images, sound, and video. Annotations can be associated with any type of object in the data model (including other annotation objects) thus supporting hier-

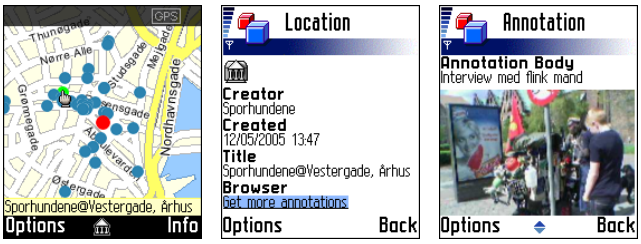

Figure 1: Browsing annotations in the field with the HyConExplorer geo-spatial hypermedia client. Dots on the map signify annotated physical locations.

archical annotation threads. Combined with a GPS sensor, the system lets users search and browse their current location for annotations and Web pages as illustrated by the screen shots in Figure 1 (for a thorough introduction to the HyCon framework and data model please refer to [2, 7]).

HyConExplorer/J2ME is designed around an extended Model-View-Controller (MVC) architecture integrating a sensory system into the application through special sensor controllers as shown in Figure 2. This design allows the application to be controlled by the user through normal input controls and by the sensor controllers when changes appear in the physical context. The application runtime model is updated with hypermedia structures from the HyCon server through a number of special services, each responsible for retrieving data from the server and parsing it into HyCon hypermedia objects.

Introducing RSS data feeds from blog servers as the annotation back-end required minor modifications to HyConExplorer/J2ME architecture: Instead of using the HyCon annotation services, a new RSS data service was developed. This service operates on a list of user subscribed RSS feeds (describing annotation data), and retrieves and parses the RSS data into structures corresponding to the original HyCon data model. Converting the RSS information to HyCon annotation objects allowed us to keep the rest of the application unmodified. Thus, the RSS feeds are used as the distribution medium for the annotation data, but does not affect the data model or application design.

3. THE RSS PLATFORM

RSS (originally developed as "RDF Site Summary" by Netscape in 1999 for use on the My Netscape portal[3]) was designed as a format for content syndication feeds. Today, RSS is a whole family of XML formats, where some use a RDF-based data model, while others use their own proprietary data model. This also affects the meaning of the acronym RSS, which is now widely known to mean "Really Simple Syndication" (See the RSS 2.0 specfication[4] for more information on the history of RSS). The most commonly used formats are: RSS 0.92 Userland, RSS 1.0 RDF, and RSS 2.0 Userland (the latter was chosen for our implementation). The basic structure of an RSS 2.0 feed is an XML document with a top element `<rss version="2.0">...</rss>` with a sub-element `<channel>` containing the feed and associated meta data. The primary content of the feed is organized in `<item>` sub-elements corresponding to postings or comments on a blog.

[3] `http://my.netscape.com/publish/formats/rss-spec-0.91.html`

[4] `http://blogs.law.harvard.edu/tech/rss`

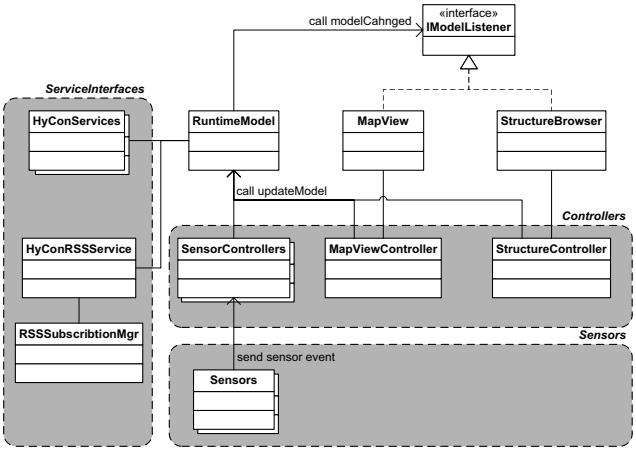

Figure 2: Overview of the HyConExplorer application architecture. The application has been modified to handle RSS input.

3.1 Pingback

Pingback[5] is a mechanism for supporting requests for notifications when a Web resource is being linked. A resource is said to be pingback-enabled, if it advertises an address of a Pingback server, either in the HTTP header (often used for non-HTML resources) or inside a `<link>` element. Pingback is used in blogs, where the notification part is implemented by the blog and the Pingback server receives the notification. This provides automatic updates of the postings in a blog with links back to the annotating blog post. An advantage of this technique is that comments on other's blog postings are stored on the commenter's personal blog providing a higher degree of control than normally afforded to most blog comments. Furthermore, when used this way, the comment threads are distributed across multiple blogs allowing for a highly distributed, lightweight commenting and annotation system.

3.2 Describing Annotations in RSS

To use RSS as the distribution medium for HyCon annotation objects, the annotations have to be expressed in the RSS feed format. This can be achieved by regarding each annotation as a blog post and expressing it as `<item>` RSS elements in the feed.

Blogs typically publish feeds along two axes: one axis is all the postings of the blog, and the other being all the comments for a single posting. In Figure 3 the first kind of feed can be seen, where the `<item>` element contains the posting information including context information about the physical location, where the posting was created (in the `<geo:Point>` element). Furthermore, a link for the second kind of feed (the comments feed of the posting) is included in the `<wfw:commentRSS>` element. By traversing the link to the comments feed, all comments for the posting are available in `<item>` elements. Some comments could have their content directly stored in the same blog as the head posting, and others created with the Pingback mechanism

[5] `http://www.hixie.ch/specs/pingback/pingback-1.0`

```
<?xml version="1.0" encoding="UTF-8" ?>
<rss version="2.0" xmlns:wfw="http://wellformedweb.org/CommentAPI/"
 xmlns:dc="...">
 <channel>
  <title>HyCon Blog</title>
   ...
  <item>
   <rdf:RDF
   xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
   xmlns:geo="http://www.w3.org/2003/01/geo/wgs84_pos#"
   xmlns:hycon="http://hycon.daimi.au.dk/ns/">
    <geo:Point>
     <geo:lat>10.1671</geo:lat>
     <geo:long>561759</geo:long>
     <hycon:x>572460</hycon:x>
     <hycon:y>6226278</hycon:y>
    </geo:Point>
   </rdf:RDF>
   <title>Hello world!</title>
   <link>http://www.../wp/?p=1</link>
   <comments>http://www.../wp/?p=1#comments</comments>
   <pubDate>Mon, 13 May 2005 12:01:05 +0000</pubDate>
   <dc:creator>Administrator</dc:creator>
   <guid>http://www.../wp/?p=1</guid>
   <description>This is a blog post</description>
   <wfw:commentRSS>
    http://www.../wp/?feed=comments-rss2&p=1
   </wfw:commentRSS>
  </item>
 </channel>
</rss>
```

Figure 3: Geo-spatial annotations in RSS 2.0

would have a snippet of their content and a link to where the comment is stored. So, by adding context information, in this case location information, the HyCon geo-spatial hypermedia annotations can be expressed as augmented RSS 2.0 feeds.

4. RELATED WORK

The HyConExplorer/J2ME described herein and elsewhere [1, 2, 7] explores the use of contextual information on platforms ranging from smart phones to tablet PCs. A wide variety of other systems have explored the use of contextual information, usually in the form of location data. An early system was the Xerox PARCTab [9] which relied on IR communication and provided a room sized location resolution. Location based information systems have also been used for e.g., tourist information [3] or woodland education [10]. A number of systems have been developed for smart phones, typically allowing the user to annotate or comment on a location. The HyConExplorer/J2ME described herein relies on GPS coordinates to pinpoint locations. GPS receivers are still an unusual component in mobile phones, so most phone based systems rely on cell information to infer location. However, even with triangulation cell based location is not as precise as GPS, but for uncritical purposes the ubiquitousness of the service wins over absolute precision. An example of a system relying on cell triangulation is the TagandScan system[6], which enables users to publish and retrieve information based on their current location. Other systems such as Nokia Sensor[7] or Pantopic[8] rely on Bluetooth to provide social networking with other users in the immediate vicinity.

[6] http://www.tagandscan.com/
[7] http://www.nokia.com/nokia/0,,73651,00.html
[8] http://www.pantopic.com/

5. DISCUSSION AND CONCLUSION

RSS is designed to syndicate weblog articles and comments. We found its design to scale nicely to also describe annotation information. RSS as a distribution medium is very lightweight and supports high distribution of data on different servers and high scalability. Being an XML format, RSS can easily be extended with new elements, e.g., by using special name-spaces. To describe the relationship between places and annotations we augmented RSS with W3C RDF elements describing WGS84 GPS points[9] Generalizing this work from being limited to geo-spatial data to supporting a general notion of context data in RSS is an interesting topic for future work. This could be done by augmenting RSS items with simple typed key-value pairs capable of describing arbitrary context information or by formulating a special purpose grammar for context information as illustrated by the ContextML language [8].

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[9] http://www.ukoln.ac.uk/metadata/resources/dc/datamodel/WD-dc-rdf/