

# Standardizing ePub Annotations

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## Perspective

Consumers of media now expect significant interaction with producers of media. This is true of the Web and, increasingly, also of TV and radio. Publishers of electronic books allow limited user interaction via functionality such as dictionary lookups and annotation capabilities. To date, there has been no standard mechanism to represent eBook annotations, nor is there a standard way to share annotations. The lack of standards has fostered the promulgation of proprietary techniques, such as those used by the Amazon Kindle and Apple iBooks.

Standardized annotation of documents would be a logical next step for the ePub standard. The standardization of eBook annotations could enable new functionality for consumers and new business models for publishers, such as shared annotation services and even social networks of shared annotations.

## Viewpoint

Annotation of documents within ePub would allow users a wide range of new functionality. In addition to simply annotating a document and storing those annotations locally, a user could *share* those annotations with one more annotation services on the Web. With multiple users contributing annotations to any number of annotation services, users could then also begin to *receive* annotations from those services and create a community of production, distribution, and consumption of document annotations.

This idea of annotation sharing whole-heartedly embodies the Web 2.0 model of user interaction encouraging collaboration within and across documents. With this capability a publication can be transformed from a static piece of text into a “living” Web-based document with content far richer and more far-reaching than was previously available.

Resource Description Framework in attributes (RDFa), a W3C Recommendation for the embedding of rich metadata within (X)HTML documents, is a serialization of the Resource Description Framework (RDF) data model, which is also a W3C Recommendation. Linked Data, a set of techniques based on RDF, allow for the combination of RDF data including information extracted from documents containing RDFa. The existing ePub standard represents documents in XHTML and thus is prepared for the addition of RDFa markup without causing major disruption in implementations.

# Proposal

We propose to augment the ePub standard to allow for highlighting and annotation of XHTML documents with RDFa. RDFa would be used as a standard mechanism to store metadata, provenance information, and new content contributed by users. Retrieval, provision and sharing of RDFa-based annotations would be performed via defined (and optional) JavaScript libraries without the need to introduce generalized scripting capabilities.

## *1) Store Annotations Locally*

Being able to store annotations within the document itself can be achieved by simple manipulation of the Document Object Model (DOM). Rather than keeping annotations separate from the document, therefore requiring either the user or the system to be responsible for the transfer of the annotations, RDFa allows the annotations to become *part* of the original document. All of the use cases below demonstrate this functionality.

## *2) Share and Receive Annotations To and From the Web*

Storing annotations locally is useful and is a prime example of interactivity within a document but ultimately falls short of the collaborative goals of the Web 2.0 model. To cross that final hurdle users must be able to share and receive annotations to and from the Web and to do that we'll use JavaScript. Simple JavaScript calls will allow annotations to not only be stored locally within the document, but also placed on one or more annotation Web services. JavaScript could also allow one user to gather another user's annotations from the Web service and compare and contrast the two versions. Use cases 3 and 4 highlight this functionality. Use case 3 looks at non-conflicting annotations while 4 examines conflicts across annotations of the same text.

## **Use Cases**

### *1) Annotation without Content (Highlighting)*

RDFa is designed for markup and thus allows for attributes to be assigned to existing tags within a document or any new tags that are generated. Let's say for example that a user is searching a document and finds something of interest to them. With only a bit of JavaScript a user could simply highlight a piece of text and immediately insert new tags and attributes into the DOM. These tags and their respective attributes could then be used for any number of purposes as they are uniquely identified and contain self-describing metadata.

For example, take this HTML document prior to annotation:

```
<html>  
...
```

```
<body>
...
<p>The quick brown fox jumped over the thing I can't remember</p>
...
</html>
```

Here is the same HTML document after annotation with RDFa:

```
<html version="HTML+RDFa 1.1">
...
<body prefix="ex: http://example.com/annotation/1.0/">
...
<p>The quick brown fox jumped over the <span id="mySample"
property="ex:highlight">thing I can't quite remember</span></p>
...
</html>
```

These three simple additions vastly increase the power of the document. The “version” attribute in the `<html>` tag lets the browser know this page contains HTML and RDFa. The “prefix” attribute in the `<body>` tag makes it easier to read URI’s later in the document. The “property” attribute on the `<span>` tag let’s us and the computer know the text contained within this tag is an annotation. This type of markup would be ideal for a feature such as highlighting, allowing the user to easily highlight a subset of text and later retrieve it based solely on a given tag’s attributes.

## 2) Annotation with Content (Notes)

The previous example looks at a use case of simply highlighting a text field. While this is technically interactive it is not all that interesting. Now if a user could make notes regarding this text, imparting his or her own opinion about the selected text, that would become more interesting and more collaborative. While highlighting was facilitated by the “property” attribute, notes will be facilitated by the “content” attribute. This approach looks nearly identical to an annotation without content except for one important difference.

Here’s our HTML document again, with our highlighting RDFa already included:

```
<p>The quick brown fox jumped over the <span id="mySample"
property="ex:highlight">thing I can't quite remember</span></p>
```

Now here’s what it would look like if we wanted to make a note:

```
<p>The quick brown fox jumped over the <span id="mySample"
property="ex:annotation" content="lazy dog">thing I can't quite
remember</span></p>
```

As you can see, the only difference is the “content” attribute in the existing `<span>` tag. This is very powerful because it allows the user to actually embed the annotation in the document, as RDFa markup of an existing XHTML tag.

### *3) Multiple Non-Conflicting Annotations*

Multiple annotations from different users that do not conflict will look almost exactly the same as multiple annotations from the same user. As long as there is no conflict, the only difference will be the “id” attribute associated with the annotation. This will serve as a way of distinguishing the source of the annotation.

The document currently contains only one annotation:

```
<p>The quick brown fox jumped over the 
```

If we obtained another user’s annotation via JavaScript and included it, the document could look something like this:

```
<p>The 
```

As you can see, the two annotations do not conflict and the document is in an acceptable state. This behavior is identical to if two annotations were added by the same user.

### *4) Multiple Conflicting Annotations*

With collaboration comes conflict and inevitably two users will attempt to annotate the same piece of text, causing a potential for overlapping DOM elements. Luckily this can be handled with a bit of extra JavaScript and RDFa. The trick here is to ensure proper classification of the local and received annotation. Once these two are properly documented using RDFa, JavaScript will allow us to any number of actions such as toggling visibility between the two with a button.

In this example there will be the local annotation, the received annotation, and then both of them again including the markup applied following an annotation conflict.

Local annotation:

```
<p><span id="mySample" property="ex:highlight">The quick brown fox</span> jumped over the thing I can't quite remember</p>
```

Received annotation:

```
<p>The quick <span id="yourSample" property="ex:highlight">
brown fox jumped over</span> the thing I can't quite remember</
p>
```

Local annotation following conflict:

```
<p><a onclick="show(old, new)"></a><span
id="local"><span id="mySample" property="ex:highlight">The quick
brown fox</span> jumped over the thing I can't quite remember</
span></p>
```

Received annotation following conflict:

```
<p><a onclick="show(new, old)"></a><span
id="received" style="display:hidden;">The quick <span
id="yourSample" property="ex:highlight">brown fox jumped over</
span> the thing I can't quite remember</span></p>
```

Because this implementation follows W3C standards and uses a stock JavaScript library, it could very easily be extended to include far more functionality than can be listed. For example, using the data described in this paper with standardized time stamp information, an annotation service could be used to create a living history of the document, allowing for comparisons between versions and sources of the document. As it pertains ePub, it can also be accomplished with a stock, unchanging JavaScript library, meaning that arbitrary scripting restrictions can remain in place.

## Conclusions

Using RDFa allows for the annotation of documents by one or more users and can handle conflicting annotations by allowing the user to decide exactly what they want to see. Using RDFa also means that as documents are shared, distributed, and moved between devices the annotations will not be lost, since they are now embedded within the document. Minimal changes to the ePub specification are necessary to allow the use of RDFa for annotations.

## References:

- [1] RDFa Spec - <http://www.w3.org/TR/rdfa-syntax/>
- [2] ePub Spec - <http://idpf.org/epub/30/spec/epub30-overview.html>
- [3] RDF Primer - <http://www.w3.org/TR/rdf-primer/>
- [4] Linked Data Glossary - <https://dvcs.w3.org/hg/gld/raw-file/default/glossary/index.html>