

XML – Tailor Made for Education

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Abstract.

The creation of digital assets in educational institutions requires that the creators in many cases be faced with the task of mining existing databases in new ways to extract useful, web-enabled data from them. This task is greatly simplified by the use of XML, particularly where the data may be from heterogeneous sources or be of questionable quality. This paper describes three situations where XML technology provides an institution with flexible, powerful and zero-capital-cost solutions to problems of this type.

Introduction.

The key to developing useful digital assets is in knowing what they are, as opposed to what they look like. Many institutions focus on developing templates for their information storage, which are based solely on visual attributes. This approach has a serious disadvantage; it allows no flexibility in terms of how the information in an asset is used because it is, by definition targeted towards a particular medium.

This approach breaks down completely when the consumer of the information wants to use a different medium for receiving the information. A visually impaired person might want to use a voice browser; a person on the move might only have access to a WAP phone. If however, information is stored in a fashion that tells the consumer what it is, all of these issues disappear. If a consumer knows what a piece of data actually represents, they can infer what it looks like from their particular context.

In educational institutions there are generally a wide range of documents that have a great deal of similarity. If the information in these documents is stored in a form, which retains its meaning, they can all be rendered on whatever medium is appropriate to the context. Consider the benefits to an institution if making a single change in one place could alter the look of every official document and if every document could be re-used in multiple contexts.

One technology that enables this to happen is XML, the eXtensible Mark-up Language, in the following sections, a description of the XML transformation process is given, then three case studies of how it is being applied in different educational contexts are presented.

XML How Does it Work?

XML processing has two stages; in the first place, the information to be stored is codified in a format that suits the provider and the consumer. This process, though it sounds complex, is actually very simple; a sample of how one might codify the papers for this conference is given below.

The structure is self-evident, the relevant information is “tagged”, what is important to realise is that the provider of the information decides on what the tags are, there is effectively no restriction on this, the provider of the

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resource decides, ideally in collaboration with consumers, what tags will be used and therefore the tags are meaningful in the user's context.

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  <paper>
    <title>XML Tailor Made For Education</title>
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    <author affiliation="NUE">Murray MacCallum</author>
  </paper>
  <paper>
    <title>Knowledge-Based Design</title>
    <author affiliation="FSU">Walter Wager</author>
  </paper>
</conference>
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This is "well-formed" XML and it can immediately be "transformed" into a form that suits a web-browser or any other output medium. This "transformation" is the second stage in the process and to perform it, we simply need a set of rules that describe how the material is to appear on any particular medium. The fine details of how this is done are beyond the scope of this paper, but are well documented, Marchal(2000); Bradley(2000).

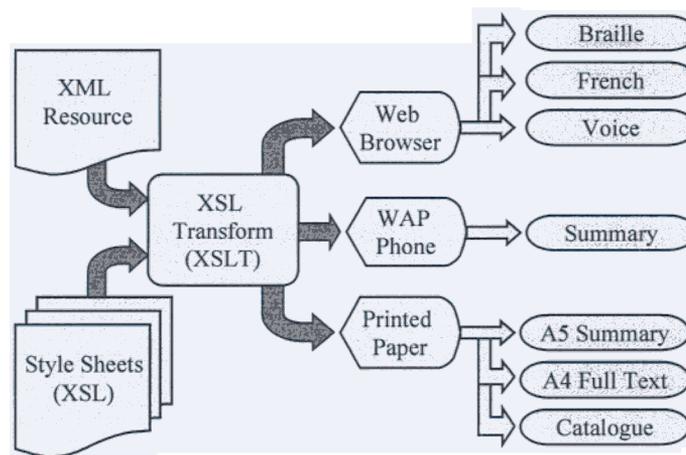


Figure 1 The XML Transformation Process

Figure 1 shows the basic process of XML transformation, that is to say the process that starts with a specific XML resource and a set of style sheets and transforms the resource using rules in the style sheets into a form which is consumable by a wide range of output media.

There are a great many books on the subject, and an in-depth treatment of it is not possible here, all of the software that is require to perform the process described by Figure 1, is freely available to anybody with an Internet connection, W3C(2001); ASF(2001).

XML In Practice; 3 Case Studies

In the following sections three examples of the application of XML in a University are described briefly, further information and demonstrations are available from the website <http://www.ul.ie/~strunz/XMLexamples/>.

Multi Lingual Lessons for Language Teaching

The task in this case was to develop a methodology, which would allow teachers to rapidly deploy specialised language teaching materials in multiple languages, French, German, English and Spanish.

The teachers had no expertise in the development of web-based teaching materials, however XML provided an elegant solution as it allowed the teachers to generate their materials in a form, which they could easily understand, and freed them from the task of laying it out.

In order to deploy a lesson, the teachers needs to learn a total of 12 tags whose meaning is clear in the teacher's context. It was found that teachers with no expertise in the area could, with help, be producing lessons after 2 hours of supervised practice.

An Expert System for Language Teachers

The use of authentic materials in language teaching is common practice. In this case a model, for their deployment was developed, Mishan(2000) and it was wished to codify this model such that it could be delivered on paper or via the web. The developer of the model had no previous experience of web design.

An XML schema for describing the logic of the model to the web-server was developed. The software automatically generates a valid navigational framework as it loads into the web browser. The models' author needed only to learn five XML tags, which were self-explanatory in her context in order to be able to input her information to the model.

The developer of the model spent three hours discussing her model to the software developer and then a further three hours learning to codify her data. The entire web-enabled model was deployed in one week from start to finish.

University Documentation

Universities and educational institutions in general generate large amounts of documentation, which needs to be authoritative and also has very wide applicability on a range of media and in a large number of different documents.

Module descriptions for example, might be used stand-alone, or in course descriptions, they might need to be available on the ordinary web, in a prospectus, or through the university's web-portal via WAP or a standard browser.

XML provides a very neat solution to this problem, by providing access to documents or fragments of documents in a unified fashion, the entire documentation process of the institution is being revolutionised. The data for this process is being extracted from existing databases and then validated using a combination of automated checking and manual verification.

Bibliography

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ASF(2001); The Apache Software Foundation; <http://www.apache.org/>