Application Profiles and Tailor-Made Conformance Test Systems

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ABSTRACT

This article examines the potential of application profiles and domain profiles as means to adapt technical specifications of data structures to particular needs. The authors argue that application profiling is better suited to increase the use of formal specifications than the creation of new specifications. The authors also describe a method to generate specific conformance test systems for machine-readable application profiles. The authors describe the respective tool set of the SchemaProf Application Profiling Tool and the Generic Test System and report on the experience of their usage in developing and introducing the IMS Common Cartridge domain profile.

Keywords: Application Profile, Conformance Testing, Domain Profile, Specification

INTRODUCTION

Application profiles are adaptations of specifications to the needs of particular communities. While there are many communities that develop application profiles, few only have the resources to implement a dedicated test system for testing conformance with these profiles. This becomes even more severe if the profile involves several XML schemas or uses restrictions that cannot be expressed by XML schemas. The paper describes the role played by application profiles in the specification process. The development of the IMS Common Cartridge specification (IMS, 2008) serves as an example. Then SchemaProf, a tool to capture machine readable application profiles, is described. Based on these profiles a Generic Test System can be instantiated to create a profile-specific Test System. The final section describes the actual experience gained with this technology. All views expressed in this paper are solely those of the authors and do not express any position of the mentioned organizations.

APPLICATION PROFILES – THEORY AND PRACTICE

Application Profiles and Alternatives

Only seldom general specifications meet exactly the needs of particular communities. Most
existing specifications have been designed to support all cases of data exchange that could be envisaged as being relevant. Consequently, these specifications tend to become complex. From the point of view of a community, that intends to adopt a specification for its internal data exchange, such specifications are overloaded with many features which are not used (yet) by this community. While this rarely makes using the specification impossible – as most of the unnecessary features are usually optional – it makes implementing the full specification often complex without delivering additional benefits.

However, even the most generic specification shall miss to specify some issues that are needed for a particular community. Also this does not hinder the use of modern specifications as they contain extension points where the community may extend them at will, assuming that their extensions shall be tolerated by conformant systems designed for other communities and based on the same base specification.

These two modifications – eliminating superfluous elements from the specification and extending it with specific additional definitions – are the fundamental operations of application profiling as discussed below. Building the specifics needed by a community into an application profile offers important benefits:

- The application profile can be easily extended, should additional demands occur which have been foreseen in the generic specification.
- Bringing the own specific demands into the development of the base specification helps making it more usable.
- Data exchange beyond the boundaries of the envisaged community is directly supported since other systems, using different application profiles based on the same specification, can immediately re-use those data which are relevant for them.
- Understanding the generic specification helps understanding the needs of neighboring communities and appreciating the real value of the available data.
- Working with application profiles opens up the possibility of getting an affordable conformance test system (as explained below).

The price to pay for these benefits is the effort to understand the existing specification, to select what is needed and to add what is not there yet.

The alternative to the development of an application profile is to develop a new specification from scratch. While this may save time in the development of the specification, since no needs of the wider world have to be considered, it guarantees non-interoperability with whatever systems exist, respectively it creates the need for the implementation of additional mediator systems which translates the data formats between the different “standards”.

Unfortunately, this happens all too often. For example there are at the time of this writing (April 2010) four specifications how to encode learning-related personal data - IMS LIP/IMS ePortfolio (IMS, 2005; IMS, 2005a), CEDEFOP Europass (CEDEFOP, 2004), UK LEAP 2.0 (CETIS, 2009), HR-XML 3.0 (HR-XML, 2009). As there is an obvious need to re-use such data in the course of lifelong learning, having such a variety of specifications even in this restricted field can hardly be perceived as optimal.

By far the most frequent argument for starting a re-specification project is, that existing specifications are “too complex and are therefore not taken up”. In recent discussion this is often seconded by a more fundamental criticism on the use of complex and deeply nested data structures, advocating the use of simple re-usable and interrelated “core components” as proposed by UN/CEFACT (UN/CEFACT, 2003), essentially consisting of name-value pairs. Of course, working with such simple structures cannot eliminate the need to encode the complexity that lies in the domain to be modeled – in fact the complexity is shifted from the complexity of data structures to the complexity of the network of relations between those structures.
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